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ERRATA.

Page 5 10 lines from end for “ **17** ” read “ **18** ”
,, 12 line 1 for “ *estaceipes* ” read “ *testaceipes* ”
,, 18 ,, 19 ,, “ 36 ” read “ 38 ”
,, 26 line 27 should read “ *Melipona* (*Trigona*) *amalthea*, Ol., and *M.* (*T.*) *silvestriana*, Vachal ”
,, 43 ,, 29 for “ Scolytid ” read “ Cerambycid ”
,, 114 ,, 2 ,, “ 979–980 ” read “ 879–890 ”
,, 120 ,, 8 ,, “ op.” read “ sp.”
,, 139 6 lines from end for “ 12 ” read “ 8 ”
,, 145 line 31 for “ *rosenümmlleri* “ read “ *rosenmülleri* ”
,, 183 lines 36 and 37 for “ minutes ” read “ seconds ”
,, 192 line 37 for “ GARAVANI ” read “ GARAVINI ”
,, 219 ,, 21 ,, “ **Viroses** ” read “ **Viruses** ”
,, 224 ,, 18, p. 252 line 15 and p. 265 line 23 for “ Jack ” read “ Tucker ”
,, 235 ,, 27 for “ *Ulodenus* ” read “ *Ulodemis* ”
,, 251 ,, 27 ,, “ *trisulcatus* ” read “ *trisulcus* ”
,, 255 9 lines from end for “ Rowe ” read “ Bowe ”
,, 262 line 5 for “ *Aconita* ” read “ *Acontia* ”
,, 265 lines 27 and 38 and p. 547 line 15 for “ Froggat ” read “ Froggatt ”
,, 276 10 lines from end for “ *marginata* ” read “ *cinerea* ”
,, 281 line 24 for “ Parrot ” read “ Parrott ”
,, 359 ,, 9 ,, “ *Diabrachys* ” read “ *Dibrachys* ”
,, 367 13 lines from end for “ *Chrysobothrys* ” read “ *Chrysobothris* ”
,, 370 9 lines from end for “ anholocylic ” read “ anholocyclic ”
,, 384 last line for “ *Chalcocophora* ” read “ *Chalcophora* ”
,, 495 3 lines from end should read “ *Cylistosoma* (*Platysoma*) *oblongum* ”
,, 522 12 lines from end for “ no. 8 ” read “ no. 2 ”
,, 555 line 28 for “ *Stomatorhina* ” read “ *Stomatorrhina* ”
,, 575 ,, 23 ,, “ 1928 ” read “ 1898 ”
,, 620 ,, 29 ,, “ JEPSON (W. J.) ” read “ JEPSON (W. F.) ”
,, 652 ,, 24 ,, “ KNULL (J. M.) ” read “ KNULL (J. N.) ”
,, 699 ,, 25 ,, “ *eppippium* ” read “ *ephippium* ”
,, 706 ,, 26 ,, “ Allen ” read “ Allan ”
,, 710 ,, 20 ,, “ *purchasei* ” read “ *purchasi* ”
,, 711 ,, 24 ,, “ *polygonota* ” read “ *polygonata* ”
,, 712 12 lines from end for “ *Choroicetes* ” read “ *Chortoicetes* ”
,, 723 line 8 for “ Behrendt ” read “ Behrndt ”

Vol. LXIX (LITERATURE OF 1932).

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REVIEW
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SERIES A.

VOL. 22.] [1934.

THOMAS (I.). **On the Bionomics and Structure of some Dipterous Larvae infesting Cereals and Grasses. I.** *Opomyza florum* **Fabr.**—*Ann. appl. Biol.* **20** no. 4 pp. 707–721, 8 figs., 10 refs. Cambridge, November 1933.

Larvae of *Opomyza florum*, F., which is a pest of cereals chiefly recorded in Russia [*R.A.E.*, A **5** 300, etc.], were found in 1931 attacking wheat in experimental plots at Cambridge, England. The percentage of infested plants ranged from 1·3 or less in plots sown on 24th November to 28·3 in one sown on 15th October [*cf.* **16** 366]. One variety was apparently more resistant than others. The egg, larval instars and puparium of this Geomyzid are described. In the field, larvae were found in April–May and adults from June to November, being commonest in August–November along hedgerows of fields of clover and sainfoin. Eggs were laid in late October and November in the soil of pots containing seedlings of wheat, barley and grasses. First-instar larvae were found in the wheat and barley seedlings on 2nd December. In nature, the eggs overwinter; in the laboratory, they hatched in 45–62 days, and the three larval instars lasted 3–6, 2–5 and 23–30 days respectively.

MILES (H. W.), THOMAS (I.) & HEY (G. L.). **On** *Hoplocampa flava* **L., the Plum Sawfly.**—*Ann. appl. Biol.* **20** no. 4 pp. 722–730, 2 pls., 6 figs., 13 refs. Cambridge, November 1933.

Hoplocampa flava, L., is shown to be generally distributed in England and liable to cause injury wherever plums or damsons are grown extensively [*cf. R.A.E.*, A **21** 560]. Characters are given distinguishing the adult of this sawfly from those of the six other species of the genus occurring in Britain, of which *H. rutilicornis*, Klug, and *H. chrysorrhoea*, Klug, may also occur on the blossoms of *Prunus* spp. The eggs and the five larval instars are described; in the field during May–June 1932, the latter lasted about 8–9, 6–7, 6–7, 6–8 and 6–7 days respectively, and the incubation period about 3 weeks.

Mansbridge (G. H.). **The Breeding of *Ephestia kühniella* Zl. in large Numbers for Experimental Work.**—*Ann. appl. Biol.* **20** no. 4 pp. 771–774, 1 ref. Cambridge, November 1933.

It was found impracticable by mass breeding on the floor of an insectary to rear a healthy stock of *Ephestia kühniella*, Zell., for fumigation studies, etc., owing to overcrowding, a bacterial disease that attacked the larvae, and infestation by *Nemeritis canescens*, Grav., and *Microbracon hebetor*, Say, as well as several species of mites that fed on the eggs. A successful technique was evolved, in which the moths were reared on undressed wholemeal wheat flour in sterilised tins protected from mites by grease-banding and with lids fitting closely enough to prevent the escape of the larger larvae. *M. hebetor* (but not *N. canescens*) was able to enter under the lids, but an outbreak was easily suppressed by destroying infested cultures. Each tin (8 ins. high by 7 ins. in diameter) held about 250 larvae, the offspring of one pair.

Page (A. B. P.) & Lubatti (O. F.). **The Application of Fumigants to Ships and Warehouses. I. Distribution of Ethylene Oxide in empty Warehouses. II. Distribution of Hydrogen Cyanide in empty Warehouses. III. Penetration of Hydrogen Cyanide into Bags of raw Cacao stacked in Piles of different Sizes.**—*J. Soc. chem. Ind.* **52** no. 40 pp. 309 T–326 T, 14 figs. London, 6th October 1933.

Biological and chemical difficulties affect the value of laboratory determination of the toxicity of fumigants to insects. The former include factors connected with the breeding of material, such as disease, the provision of sufficient numbers of insects, individual variation and unsuspected resting stages, and also those involved in handling, by which resistance is lowered independently of the action of the fumigant [*cf. R.A.E.*, A **21** 637]. The chief chemical difficulty is that of accurate dosage under standard conditions of temperature and humidity; if the correct dosage has been found, successful commercial fumigation depends on the even distribution of the fumigant and the maintenance at every point of a sufficiently high concentration. In other words, the fumigation will be defined by the course of the time-concentration curves at every point of the space under treatment. These papers belong to a series that will deal mainly with a study of the curves obtained with different fumigants applied in various spaces, both empty and filled with goods, and including the concentration in large spaces, where bulk movement may occur, and also that in small ones, such as cracks, where penetration depends mainly on diffusion. In practice, spaces of intermediate size occur also, as for instance the intergranular spaces of many stored products, penetration into which is probably modified by absorption and desorption. Data will be presented on aeration, which is of greatest importance when the fumigant is highly toxic to man and when it is desorbed gradually from the treated materials. Measurements of concentration [*cf.* **21** 111] must be supplemented by biological tests. Detailed descriptions are given of the conditions under which the treatments described were carried out and of the buildings employed.

The following is taken from the authors' summaries of the first two papers, which contain accounts of work against the hibernating larvae of *Plodia interpunctella*, Hb., *Ephestia elutella*, Hb., and *E. cautella*, Wlk., on loose timber or in cracks of the fabric of empty warehouses: In large buildings where surface effects are not of great importance, the actual maximum concentrations of ethylene oxide and hydrocyanic acid gas average 60–70 and 60–80 per cent., respectively, of the theoretical. Satisfactory distribution of ethylene oxide was not obtained by spraying it from various levels and positions with different arrangements of the spray tubes, or of hydrogen cyanide by the agency of convection currents produced by releasing the fumigant as a warm gas [*cf.* **21** 638]. With either fumigant, mechanical agitation of the air was essential. Vaporisation of ethylene oxide by heat was found necessary, and simple forms of the apparatus required are described. A cheap experimental method of vaporising hydrogen cyanide on a large scale is discussed. In the first paper, it is shown that the concentration decreases with time at a rate varying with the conditions of the fumigation, and an outline is given of the main problems of practical fumigation that are going to be studied; in the second, some effects produced by differences in construction and building material are briefly noted, and an indication is given of the behaviour of the fumigant in the roof space between slates and boards.

The third paper deals with the effect on the penetration of hydrogen cyanide of different methods of stacking bags of raw cacao in warehouses. The two different methods of release of the fumigant are briefly described and discussed. The results appear to show that, where bags are stacked in bulk, it is impracticable to obtain a lethal concentration in the less exposed ones. Where they are stacked in piles of 2, 3 or 4 wide, the maximum concentrations obtained were respectively 75, 48 and 40 per cent. of that in isolated bags. It is suggested that wider piles than these should not be used. Those of 2 bags, which are preferable, as one end of each bag is exposed, are generally not too wasteful of space if the minor gangways in which the fumigant is released are not more than a foot wide. Cross-stacking, to stabilise the piles, is not recommended; the need for it might be obviated by the use of wooden frames. The amount of residual hydrogen cyanide varied from 32 parts per million in sheltered bags to 40–45 in exposed ones. It is emphasised, however, that other factors besides the method of stacking are important and require investigation.

LEHMANN (H.). **Luzerneschädlinge. 1. Rüsselkäfer:** *Phytonomus variabilis* **Herbst,** *Sitona lineata* **L. und** *Apion pisi* **F.** [Lucerne Pests. 1. Weevils.]—*Z. PflKrankh.* **43** no. 11 pp. 625–638, 3 figs., 11 refs. Stuttgart, 1933.

In 1933, lucerne in Thuringia was infested by *Hypera* (*Phytonomus*) *variabilis*, Hbst., *Sitona lineata*, L., and *Apion pisi*, F. In their early instars, the larvae of *H. variabilis* fed almost exclusively inside the flower and leaf buds, usually without completely preventing their development, but after attaining a length of about $\frac{1}{12}$ inch, they fed externally on the flowers and leaves. The first cocoon was seen on 26th June. Pupae were commonest in mid-July, on the lower leaves of lucerne and on grasses and weeds beneath it. The larvae rested for a few days in the cocoons before pupation, and the pupal stage lasted 5–10 days. The adults remained for 24–36 hours in the cocoons before emerging. The first were seen on 5th July. Unlike the larvae, they were very active but did not cause serious injury to lucerne. *H. variabilis* has only one generation a year in Germany, the adults living for 8–10 months and ovipositing after hibernation. If abundant, the larvae may cause defoliation, with resultant total loss of the first mowing and retardation of growth. Soft-leaved varieties of lucerne suffered the greatest injury. For severe infestations, the measures recommended below against *S. lineata* should be practised.

S. lineata, which is a well known pest of peas and beans in Germany, did considerable harm in some lucerne fields, the adults gnawing the edges of the leaves and the larvae feeding on the root nodules. The early spring feeding by the adults was particularly harmful, as the young plants were killed by defoliation or so weakened that overgrowth by weeds necessitated re-sowing. Injury by the adults decreased from early June onwards. On 3rd July, a field was inspected in which the plants had not renewed their growth after a first mowing early in June, and this condition was found to be due to infestation of the roots by the larvae. The second mowing was postponed for 10 days, but even so there was a crop loss of about 20 per cent. An arsenical dust, applied as soon as the typical injury to the edges of the leaves becomes noticeable in spring, should kill the weevils before they oviposit. Repeated loosening of the soil to promote rapid growth is a supplementary measure possible in fields where the seed has been drilled.

An outbreak of *A. pisi* was noticed early in June in an experimental plot of lucerne near Jena. Some of the plants had their leaves skeletonised. In the laboratory, the adults lived for several months, the last dying about mid-September. The larvae live in the seed-pods of *Medicago* spp., *Onobrychis sativa*, and clovers (*Trifolium pratense* and *T. incarnatum*).

THIEM (H.). **Ueber ein- und zweigeschlechtliche Kommaschildläuse** (*Lepidosaphes ulmi* **unisexualis und bisexualis,** *L. rubri* **und** *L. newsteadi*) **der deutschen Coccidenfauna.** [On Unisexual and Bisexual Mussel Scales of the German Coccid Fauna.]—*Z. PflKrankh.* **43** no. 11 pp. 638–657, 2 figs., 31 refs. Stuttgart, 1933.

The literature on the reproduction of *Lepidosaphes ulmi*, L., is briefly reviewed, and records are given from the author's observations in Saxony of the occurrence of this scale and of *L. rubri*, Thiem (Lindinger's reference of the latter to *L. ficus*, Sign. (*conchiformis*, auct.) [*R.A.E.*, A **21** 309] not being accepted) and (in one instance) of *L. newsteadi*, Sulč. The bisexual and unisexual forms of *L. ulmi* were found on different groups of food-plants, the latter being the only one recorded on fruit trees. *L. rubri* occurred on lime (*Tilia*), *Carpinus betulae* and lilac (*Syringa* spp.), and *L. newsteadi* on *Pinus nigra* var. *austriaca*, both these species being bisexual.

The apple and lilac races of *L. ulmi* described in America [**13** 569] both belong to the unisexual form. The author considers Suter's southern (Mediterranean) race [**21** 175] to be probably *L. rubri*.

RECKENDORFER (P.). **Ueber die Bedeutung der Haftfähigkeit (Windfestigkeit) von Trockenverstäubungsmitteln in der Schädlingsbekämpfung.** [On the Importance in Pest Control of the Adhesiveness (Resistance to Removal by Wind) of Dust Insecticides and Fungicides.]—*Z. PflKrankh.* **43** no. 11 pp. 662–667, 5 refs. Stuttgart, 1933.

The author describes laboratory tests in 1933 in Vienna of the adhesiveness of commercial dust insecticides, seven of which were arsenicals and one a preparation of derris, carried out by a method that reproduces the effect of wind [*R.A.E.*, A **20** 384]. He claims that the practical effect of an insecticide under normal conditions of weather and insect activity can be gauged fairly well if its poison-content and adhesiveness are known.

Will (J.). **Die wichtigsten Forstinsekten.** [The Principal Forest Insects.]—3rd Edn, revd. and enlarged by M. Wolff. Demy 8vo, xvi+220 pp., 203 figs. Neudamm, J. Neumann, 1933. Price *M*.6.

This revised edition of a text-book for forestry schools in Germany is divided into two main sections, one on insects that are beneficial or only slightly harmful, and the other on actual pests. The latter comprises 158 pages, of which 70 deal with Coleoptera and 49 with Lepidoptera. More or less detailed biological notes are given on the principal species, with brief accounts of the injuries they do and measures for their control. Notes on text-books dealing with forest insects, etc., and a subject index complete the volume.

Amtliche Pflanzenschutzbestimmungen. [Official Regulations on Plant Protection.]—*NachrBl. dtsch. PflSchDienst Beil.* **5** no. 5 pp. 134–161. Berlin, 1st November 1933.

This issue includes German regulations against the introduction from France of *Leptinotarsa decemlineata*, Say, supplementing those previously issued [*R.A.E.*, A **20** 343].

Merkel (L.). **Amtliche Pflanzenbeschau im Freihafen.** [Official Plant Inspection in 1932 in the Free Harbour, Hamburg.]—*Jber. Inst. angew. Bot. Hamburg* **50** (1932) pp. 79–88. Hamburg, 1933.
Hahmann (C.). **Abteilung für Pflanzenschutz.** [Plant Protection Division.]—*T.c.* pp. 88–116, 3 figs.

The first paper includes records of insects found during inspections of plants and plant products imported into and exported from the free harbour of Hamburg in 1932.

In the second, notes are given on the plant diseases and insect pests observed in and around the territory of Hamburg in 1932, and tests of several proprietary insecticides are reported on. Experiments in fumigating rose bushes with hydrocyanic acid gas indicated that they are not injured by a gas concentration of 0·1 volume per cent.

Pieri (A.). **La mosca della frutta** (*Ceratitis capitata* **Wied.**).—*Note Fruttic.* **11** no. 11 pp. 189–192, 1 fig. Pistoia, 1st November 1933.

This is a popular article on the biology of *Ceratitis capitata*, Wied., in Italy, and its control by means of bait-traps [*R.A.E.*, A **17** 179].

Loureiro Ferreira (M.). **Uma cochonilha perigosa** (*Aonidiella perniciosa* **Comstock**). **Seu aparecimento em Portugal.** [A dangerous Coccid, *Aspidiotus perniciosus*. Its Appearance in Portugal.]—*Arq. Secç. Biol. Parasit.* **2** no. 1 pp. 5–22, 1 fig., 1 pl., 4 refs. Coimbra, 1932. [Recd. November 1933.]

In 1931, *Aspidiotus* (*Aonidiella*) *perniciosus*, Comst., was found on pear, apple and plum trees in a locality in Portugal near the coast. A general account is given of its geographical distribution, bionomics and control, and the adult and larva are described.

Sousa d'Almeida (E.). **Experiências com o método de Lotrionte ou dos abrigos (capannette) contra o** *Dacus oleae* **Ros.** [Experiments with the Lotrionte Method against *D. oleae*, Gmel.]—*Arq. Secç. Biol. Parasit.* **2** no. 1 pp. 25–37, 3 figs., 2 pp. refs. Coimbra, 1932. [Recd. November 1933.]

An account is given of experiments carried out in Portugal in 1925–27 to test the value against *Dacus oleae*, Gmel., of the Lotrionte method of spraying bundles of twigs with a poison-bait and hanging them from the branches of the olive trees under small roofs, which protect them from rain [*R.A.E.*, A **2** 289]. The best material for the latter was found to be cork for the ridged covers and esparto grass for the conical ones. About 6 gals. of the poison-bait of sodium arsenite and molasses were used for 1,000 bundles of twigs. It is concluded that this method is likely to be effective under local conditions, and it cannot promote the growth of sooty fungus, because the sweet spray does not touch the trees. It is, however, rather complicated for the peasantry, the bait is expensive, and to attain noticeable results, treatment over a large area would have to be continued for several years.

Shabetai (C. R.). **Le traitement des graines de coton et de blé par la chloropicrine.**—*Ann. Épiphyties* **18** no. 6 pp. 398–413, 22 refs. Paris, 1933.

Since the treatment of cotton-seed with hot air to kill larvae of *Platyedra* (*Pectinophora*) *gossypiella*, Saund., is liable to destroy its germinating power if the temperature is high enough to ensure the death of all larvae in large quantities of seed, studies in its treatment with chloropicrin [*R.A.E.*, A **10** 565] were resumed.

In infested seed suspended in a muslin bag inside a sealed flask, the larvae were destroyed in 1, 24 and 72 hours respectively by chloropicrin at concentrations equivalent to 100, 8–10 and 5 oz. to 1,000 cu. ft. In tests, the technique of which is described in detail, to determine the effect of these (or sometimes higher) dosages on the germination of the seed, the maximum reduction was only 8·8 per cent. The development and yield of plants grown from the treated seed were normal.

In similar tests with weevils that infest stored cereals, *Calandra granaria*, L., and *C. oryzae*, L., were killed by exposure for 2½ and 3 hours respectively to a 5 oz. concentration of chloropicrin, whereas exposure for 24 hours to concentrations of 5 and 10 oz. reduced the germination of wheat by only 4·2 and 4·8 per cent. Exposures of varying length up to 96 hours to concentrations up to 100 oz. showed that excessive doses retard germination of varying percentages of the seed, and sometimes completely inhibit it. When germination is retarded, the plants nevertheless develop normally. Seeds that do not germinate keep their normal appearance and swell when they are subjected to conditions necessary for germination, and their embryos present no anomaly under the microscope. Their nitrogen content is also normal, but they do not germinate even after exposure for several hours to a current of oxygen.

Rapports sommaires sur les travaux accomplis dans les laboratoires en 1932.—*Ann. Epiphyties* **19** no. 1–2 pp. 1–46, many refs. Paris, 1933.

Much of the information in these surveys of work in 1932 at different entomological stations in France has already been noticed.

P. Marchal reports that investigations by B. Trouvelot and M. Raucourt showed that it is possible to extract from the leaves of potatoes by prolonged treatment with heated alcohol the chemical principles that attract *Leptinotarsa decemlineata*, Say. Leaves deprived of them are abandoned by normal larvae, though eaten by starved ones. These attractive principles are not destroyed by prolonged desiccation at 105°C. [221°F.] or the action of chloroform, but they rapidly vanish from cut leaves exposed to the air.

From the Bordeaux Station, J. Feytaud reports that in experiments by Kozlovsky, *L. decemlineata* was reared from egg to adult on four varieties of tomato, and also on *Hyoscyamus* [*niger*] and flowering plants of *Atropa belladonna*, but the larvae died in a few days on young plants of the latter. In attempts to breed successive generations of the beetle in winter for the purpose of rearing predators and parasites, successful results were obtained by isolating males and females of the first generation, which appeared at the end of July, and bringing them together about the end of September, a second generation being produced in November–December, and larvae of the third appearing in late December. In experiments by Couturier in spraying potato against *L. decemlineata*, it was found that, with an equal content of arsenic pentoxide, copper and aluminium arsenates were nearly as toxic as lead arsenate, and magnesium arsenate was more so. In field trials on a large scale, arsenical dusts, especially those containing lead arsenate or calcium arsenate, gave better results on the whole than those containing barium fluosilicate [but *cf. R.A.E.*, A **21** 636]. It was also found that the content of As_2O_5 may be reduced to 15 or even 10 per cent. without any appreciable effect on the toxicity of these dusts. Dusts, however, do not adhere so long to the leaves as sprays.

In the control of the mole-cricket [*Gryllotalpa gryllotalpa*, L.], injections of tetrachlorethane into the soil at the rate of 1 oz. to 8 sq. ft. were effective.

The application of lead arsenate on willow prevented *Phyllodecta vitellinae*, L., and *Plagiodera versicolora*, Laich., from feeding by a kind of paralysis of the mandibles. Over 40 per cent. of these Chrysomelids were found to be parasitised by the larvae of *Mermis* sp.

Derivatives of *Pinus pinaster* were tested as dormant sprays for fruit trees. Formulae containing 60 parts pine oil or sulphite liquor, 30 parts colophony and 9 parts sodium hydroxide were effective against the woolly aphis [*Eriosoma lanigerum*, Hausm.] on apple, when used at 10 per cent. strength in a 1 per cent. soap solution.

Promising results against *Scutigerella* [*immaculata*, Newp.] in fields of maize [*cf.* **14** 378] have been obtained by the application of coal ashes soaked with a mixture prepared by heating together coal tar, kerosene and carbolic acid (6 : 3 : 1).

In investigations by Couturier on the physical properties of lead arsenate sprays, the addition of flour (0·5–1 per cent.), molasses (0·5 per cent.), or especially gum arabic (0·5 per cent.) considerably increased the time that the particles remained in suspension, whereas sodium sulphoricinate (0·25 per cent.), fish oil and linseed or pine oil (1 per cent.) decreased it by agglutinating them. On the other hand, the spreading and wetting power of the spray was increased by the oils, especially pine oil, which were followed in order of effectiveness by sodium sulphoricinate, flour, ox gall (0·3 per cent.) and casein. Its adhesiveness was improved by the addition of casein or oils, especially fish oil.

From the Rouen Station, R. Regnier reports that owing to an outbreak of *Hyponomeuta padellus malinellus*, Zell., on apple, it was possible to rear in the laboratory over 50,000 larvae of the moth. Among the parasites obtained, the Ichneumonid, *Herpestomus brunnicornis*, Grav., and the Encyrtid, *Ageniaspis fuscicollis*, Dalm., were predominant, followed by *Angitia armillata*, Grav., and *Pimpla examinator*, F., which are polyxenous, and several Tachinids.

In the Avignon region, Bordas records that of the various baits used in the field against *Ceratitis capitata*, Wied., which was not abundant, 25 per cent. vinegar was the most successful, bran water [*cf.* **19** 276] coming next.

ZOLOTAREVSKY (B. N.). **Contribution à l'étude biologique du criquet migrateur** (*Locusta migratoria capito* **Sauss.**) **dans ses foyers permanents.**—*Ann. Epiphyties* **19** no. 1–2 pp. 47–142, 1 pl., 1 fig., 1 map, 13 graphs, 3 pp. refs. Paris, 1933.

The geographical races of *Locusta migratoria*, L., are regarded as subspecies, and the relationship between them is discussed [*cf. R.A.E.*, A **18** 55]. An account is given of experiments in the permanent breeding-places of *L. m. capito*, Sauss., in south-western Madagascar on the progeny of typical *solitaria* females, which assumed *gregaria* characters on being crowded. Isolated hoppers became green if kept under humid conditions [*cf.* **20** 672]. Detailed descriptions are given of the first-instar *solitaria* hoppers, as well as of subsequent changes of crowded and isolated hoppers; the coloration of the crowded hoppers is grey or brown and is characterised by the appearance of diffuse black pigmentation, the general distribution of which resembles that in the *gregaria* phase. All the female hoppers, and most of the males (except those kept in humid conditions), passed through six instars, the additional one occurring between the third and the fourth. The total development period of hoppers kept at the same temperature, but in humid and dry cages, lasted about 50 and 100 days respectively. Throughout the paper, the author gives the biometric ratios of the various types of adults discussed. The geology, relief, vegetation and climate of the breeding places in south-western Madagascar are described. The climate is dry, tending to desert, the rains are rare, chiefly occurring in the hot season, and the bulk of the precipitation may fall in the course of a few days. Each year, two generations of locusts are produced during the hot season, the hoppers of the first appearing in November and becoming adult in January, and those of the second appearing in February and becoming adult in March–April. The second generation, however, does not reach sexual maturity until the next rains, owing to the intervention of the dry cold season. It is considered that sexual development cannot take place at a relative humidity below 60 per cent.

A detailed account is given of the author's observations in different parts of the permanent breeding area in the course of several years and under different conditions. The relative humidities in the habitats preferred by adults and hoppers are 60 and 70 per cent. respectively, and the adults are the more selective, moving from one habitat into another if the humidity conditions become unsuitable. In particular such movement was observed in the Betioky breeding area. This can be divided into four humidity zones; as these dried up progressively, locusts were seen to move gradually from one to another.

The hoppers do not usually migrate from a given habitat, even if the conditions in it become unfavourable, but they climb to the tops of the plants if humidity increases, and descend if it decreases. They leave a dry habitat and move into a more humid one only if the two are adjacent. Adults from larvae developing in the dry zone had a tendency to assume *congregans* characters, which, however, never advanced far when they were brought about by dryness alone.

The association of the solitary phase of this locust with other species of solitary Acridids is discussed. It varies with the seasons, for unlike the locusts, these do not migrate with the drying up of the different zones.

Scelio zolotarevskyi, Ferrière [**18** 426] was once found parasitising the eggs. Cryptogamic parasites are rare, the climate being unsuitable to them. It is unlikely that parasites exercise any appreciable check on this locust, but it is undoubtedly affected by predators, which include small reptiles, insects, spiders, Myriapods and birds, particularly a bee-eater, *Merops* sp., great numbers of which are found in the permanent breeding-places.

As a result of his experiments and field observations and an analysis of events that preceded the 1928 outbreak in southern Madagascar, the author concludes that although the phase *congregans* can frequently make its appearance in the permanent breeding areas, the complete transformation into phase *gregaria* can only occur in localities surrounded by arid areas, and in which the conditions are essentially unstable. It is brought about first by favourable conditions, such as abundant precipitation for an extended period, during which the area of suitable habitat enlarges and there is a marked increase in the number of *solitaria* individuals (as in Sahinta in 1926–27, when during the exceptionally long wet season three generations might have developed instead of two). This must be immediately followed by unfavourable conditions, such as drought, during which the habitable area becomes restricted and the numerous adults are crowded together. The density of population increases on the hatching of hoppers from eggs laid in a restricted area, and this brings about the production of the *gregaria* phase.

ANDERSON (T. J.). **Entomological Section.**—*Rep. Dep. Agric. Kenya 1932* pp. 95–110. Nairobi, 1933.

H. Wilkinson describes a method evolved in Kenya in 1932 for the heat treatment of imported coffee ready for the market, which was found effective against all stages of *Stephanoderes hampei*, Ferr., and did not appreciably affect the colour or weight of the beans. The coffee (in a double bag) is subjected for 30 minutes to 120°F. in a timber-drying kiln, the temperature and humidity being regulated throughout the process to prevent drying of the beans or the condensation of moisture on them. The temperature at the surface of the bags is not allowed to rise above 138°F. The coffee must then be allowed to cool in the kiln for at least 12 hours to prevent any change in colour. In treating 10 tons, the desired temperature was not obtained in the coolest part of the kiln for 33 hours, after which 124°F. was recorded in the hottest part. The temperature at the centre of the bags remained at 120°F. for 21 hours after treatment, and it was not identical with that at the surface until 67 hours had elapsed. This treatment was also effective against all stages of *Bruchus* in beans, without changing their colour or reducing the percentage of germination.

H. C. James states that the preliminary application of bituminous paint [*R.A.E.*, A **21** 33, 108] now in general use in banding coffee trees against ants fostering *Pseudococcus lilacinus*, Ckll., does not completely protect the trunk from the harmful properties of the repellents, as the paint eventually cracks. Young trees have been killed by painting from ground level to the usual point of application of the band, with a view to preventing damage by cutworms. Banding greases may be tested for immediately toxic effects by applying them to the young foliage. Thallium salts proved an effective poison against *Pheidole punctulata*, Mayr, but are too expensive and dangerous for use in the field.

The warmer, drier conditions usually prevailing at about 5,000 ft. checked the activities of *Lygus simonyi*, Reut. This bug was recorded from *Canthium* sp. during the year and a survey of plants of this genus is being undertaken with a view to finding possible wild food-plants. According to R. H. Le Pelley, it caused some damage to coffee in the Kiambu district, though owing to the favourable conditions a good crop was obtained in most cases. The thorough application of pyrethrum sprays [**21** 265] resulted in an increased yield, crops of over a ton per acre being obtained over large areas. It now appears improbable that this spray will seriously interfere with the control of *P. lilacinus* [**21** 266]. The prevalence of various leaf-miners may, however, have been due to the destruction of their parasites by the pyrethrum and also by the sweetened sodium arsenite bait sprays applied against *Antestia lineaticollis*, Stål, which caused serious loss in this district. *Leucoptera coffeella*, Guér., has increased greatly during the last two years and was severe on numerous plantations. *P. lilacinus* was so harmful in some estates over 6,000 ft. that banding against *Pheidole punctulata* was necessary for the first time.

F. B. Notley records work on coffee pests in the Sotik-Kericho area, including *Antestia* [**21** 302], the egg parasites of which sometimes cause over 95 per cent. mortality [*cf.* **20** 117 ; **21** 107]. The minimum life-cycle of *Metadrepana andersoni*, Tams, from oviposition to emergence was 39 days, with averages of 50·25 and 52·75 for the males and females respectively [*cf.* **16** 307]. A maximum of 568 eggs was laid by a single female in 12 days. The larvae refused to feed on *Sesbania*, *Calpurnia aurea*, *Grevillea robusta* and maize, which have been recorded as food-plants. Capsids other than *Lygus simonyi*, which has not yet been reported from this area, caused considerable damage to coffee flower-buds. Minor pests of coffee were *Epiplema dohertyi*, Warr., and *Aleurocanthus* sp. The latter produces slight swellings on the lower surface of the leaves and, when numerous, a blotchy appearance of the upper surface, and causes green patches to remain on the ripening fruit.

[BLUNT (D. L.)]. **Locust Campaign.**—*Rep. Dep. Agric. Kenya 1932* pp. 315–318. Nairobi, 1933.

Locusta migratoria migratorioides, R. & F., appears to have been the only locust present in Kenya during 1932, though occasional reports of *Schistocerca gregaria*, Forsk., were received. An improved coffee parchment bait [*cf.* *R.A.E.*, A **20** 68] was highly efficient even where fresh grass was available, except on the coast, where the presence of salt may have rendered it unattractive. By mid-February, a considerable proportion of hoppers had been destroyed ; and by about 10th March, the remainder, including some that had hatched in places inaccessible to control measures, had migrated south and south-west, leaving the Colony practically clear of infestation. Mature swarms returned from the latter direction, however, in the last half of March and began ovipositing in April. Owing to less intensive egg-laying and to the activities of egg parasites, particularly Tachinids, control was obtained with comparative ease in the Nzoia and Nyanza Provinces. In the Rift Valley, however, the situation was the most serious that has occurred recently, and the infestation was also heavy in Machakos and on the Ukamba-Kikuyu border. As a result of a vigorous control campaign, however, comparatively small numbers of locusts matured and, though they were reinforced by swarms from the north-west border, not many eggs were laid during the short rains, and by the end of the year a few scattered colonies alone remained, necessitating only local action.

Compared with the previous year [*loc. cit.*], the loss to crops was small, not exceeding 10 per cent. of cereals other than wheat, late planted crops of which were badly damaged on the Plateau. Very severe injury was caused over wide areas to grasses, which were plentiful in most districts owing to favourable conditions of rainfall. Such infestation involves progressive deterioration of the pastures, the better types of grass being selected by the locusts, so that the coarser ones are encouraged.

The organisation of the campaign and the methods employed are discussed. Baits were supplemented by power sprayers, which proved invaluable where the presence of water made their use practicable. In comparison with hand pumps, their high initial cost is saved in sodium arsenite alone within 2 months, and the area that can be treated within a given time is considerably greater than with any other apparatus.

STOREY (H. H.). **Investigations of the Mechanism of the Transmission of Plant Viruses by Insect Vectors. I.**—*Proc. roy. Soc.* (B) **113** no. B 784 pp. 463–485, 1 fig., 1 pl., 15 refs. London, 1st September 1933.

A detailed account is given of studies carried out at Amani, Tanganyika, of the behaviour of the virus of streak disease of maize in its vectors, *Cicadulina mbila*, Naudé, and *C. zeae*, China, which have already been noticed from a shorter paper [*R.A.E.*, A **21** 486].

CHIAROMONTE (A.). **Considerazioni entomologiche sulla coltura delle cereali nella Somalia Italiana.** [Entomological Notes on the Cultivation of Cereals in Italian Somaliland.]—*Agric. colon.* **27** no. 10 pp. 484–487. Florence, October 1933.

Insects found attacking maize in Italian Somaliland were : *Anomala plebeja*, Ol., and *A. egregia*, Gah., which attack the roots, especially before thinning, *Sorghum* being apparently immune ; *Termes classicus*, Sjöst., and the Aphid, *Geoica pseudosetulosa*, Theo. [*R.A.E.*, A **17** 20], which injure young plants ; *Anaphothrips alternans*, Bagn., which lives under the leaf-sheath ; *Aphis maidis*, Fitch, which, besides feeding on the stalk, has often been found on the inflorescences, together with *Frankliniella dampfi*, Priesn., and adults of the Meloids, *Epicauta* *estaceipes*, Fairm., and *E. jeanneli*, Pic, which are perhaps only occasionally harmful; the Arctiid, *Diacrisia* (*Spilosoma*) *investigatorum*, Karsch, which attacks the panicles before the formation of the grain; and *Heliothis obsoleta*, F., *Sesamia* sp., *Argyroploce leucotreta*, Meyr., and *Cirphis loreyi*, Dup., which feed on the milky grains.

Stored grain (maize and *Sorghum*) was infested by cosmopolitan warehouse pests, chiefly *Corcyra cephalonica*, Stn., less important ones being *Ephestia cautella*, Wlk., *Tenebroides mauritanicus*, L., *Silvanus* sp., *Tribolium castaneum*, Hbst. (*navale*, auct.), *Rhizopertha dominica*, F., and *Calandra* (*Sitophilus*) *oryzae*, L. They did very little harm in the primitive native silos, which consist of a pit covered with beaten earth, on account of the asphyxiating carbon dioxide given off by the seeds.

Aphis maidis is preyed upon by the Coccinellids, *Cydonia lunata*, F., *C. vicina*, Muls., *C. propinqua* var. *nigrescens*, Wse., *Hyperaspis usambarica*, Wse., and *Scymnus morelleti*, Muls. *Heliothis obsoleta* is parasitised by *Sarcophaga* sp. and the Tachinids, *Sturmia inconspicua*, Mg., and *Gonia bimaculata*, Wied., *Cirphis loreyi* by *Apanteles ruficrus*, Hal. [*R.A.E.*, A **21** 643], *H. obsoleta* by an unidentified Braconid, and *A. leucotreta* by *Pristomerus* sp. [**21** 584]. The Chalcid, *Antrocephalus aethiopicus*, Masi [**14** 518] occurred in warehouses, probably parasitising *Corcyra cephalonica* and perhaps also *E. cautella*, and the ant, *Euponera sennaarensis*, Mayr, was a predator on the larvae of *C. cephalonica*.

NATTRASS (R. M.). **Preliminary Notes on some Entomogenous Fungi in Egypt.**—*Bull. Minist. Agric. Egypt* no. 120, 9 pp., 6 pls., 5 refs. Cairo, 1932. [Recd. November 1933.]

Notes are given on the characters of the following entomogenous fungi found in Egypt during the period 1927–1930: two species of *Empusa*, of which one was apparently responsible for the death of large numbers of *Euprepocnemis plorans*, Charp., and the other was observed on larvae of *Prodenia litura*, F., in captivity but not in the field; *Aspergillus flavus* on *Trionymus* (*Pseudococcus*) *sacchari*, Ckll. [*R.A.E.*, A **11** 35]; and *Beauveria bassiana*, *Metarrhizium anisopliae* and *Mucor* sp., allied to *M. racemosus*, all on *Anacridium aegyptium*, L. The bodies of freshly killed locusts of this species were successfully used as a medium for the cultivation of *B. bassiana*, but attempts to infect living locusts by spraying them and their food material with a suspension of the conidia gave no conclusive result. The species of *Mucor* was only found on a single insect and may not be a true locust parasite.

Le ver de la feuille en 1933.—*Bull. Un. Agric. Égypte* no. 244 pp. 582–583. Cairo, 1933.

Local outbreaks of *Prodenia litura*, F. (*littoralis*, Boisd.) were particularly frequent in Egypt in 1933. In addition to cotton, which suffered most, maize, ground-nuts [*Arachis hypogaea*] and berseem [*Trifolium alexandrinum*] were also attacked. Extreme heat generally retards the development of the moth, so that outbreaks usually cease about mid-July in the centre of the Nile Delta and at the end of July in the extreme north. Under these conditions, the eggs can be collected without injury to the young cotton plants, on which most of them are laid. In the summer of 1933, however, on account of peculiar conditions of temperature and humidity, successive generations continued throughout almost the whole of August. Owing to the advanced stage of development of the plants, the collection of eggs and larvae caused almost as much damage as was sustained where no control was attempted. The batches were also difficult to locate and succeeded each other with great rapidity. In some fields, the greater part of the crop was lost, both the leaves and the buds that should have given rise to the second crop being destroyed. As, however, the areas where attacks persisted in this manner were not very extensive, the damage as a whole was not of great importance.

SUIRE (J.). **Remarques sur la courtilière.**—*Progr. agric. vitic.* 1933 reprint 4 pp. Montpellier, 1933.

A brief account is given of the bionomics of *Gryllotalpa gryllotalpa*, L., in France, and a poison-bait containing barium fluosilicate [*R.A.E.*, A **20** 257] is recommended for its control.

SUIRE (J.). **Remarque sur la biologie des teignes des ruches** *Meliphora* (*Achroea*) *grisella* **F. et** *Galleria mellonella* **L.**—*Bull. Soc. cent. Apic.* 1933 no. 10 reprint 11 pp., 1 fig. Fontenay-le-Comte, Vendée, 1933.

In view of the fact that the wax moths, *Galleria mellonella*, L., and *Achroia* (*Meliphora*) *grisella*, F., are often confused by bee-keepers in France, the synonomy of both species is discussed and their distinguishing characters given. The literature on their bionomics is reviewed and compared with the results of the author's recent observations. The life-cycle of *G. mellonella* has been shown to last about 8 weeks at 30°C. [86°F.]. The eggs are not laid exclusively on the comb [*cf. R.A.E.*, A **18** 485], but may be deposited on reserves of honey or pollen, on the frames or even in cracks of the hives themselves, and hatch on flakes of wax not built into the comb.

The life-cycle of *A. grisella* is rather longer than that of *G. mellonella* at the same temperature. The eggs may be laid and will hatch anywhere in the hive. The average number laid by one female is 250–300, and the incubation period varies from 5 days at 30°C. [86°F.] to 22 days at 16°C. [60·8°F.]. Below normal hive temperatures, the larvae develop more easily than those of *G. mellonella*, but few pupate below 15°C. [59°F.]. The complete life-cycle at 25°C. [77°F.] requires 60–75 days. The adults appear at the beginning of April near Montpellier, and 3–4 generations succeed one another until November or December.

The Hornet and Methods of combating it.—*Vet. Serv. Ser. Dep. Agric. Palestine* **7** no. 1, 6 pp., 3 figs. [Jerusalem] 10th May 1933. [Recd. November 1933.]

Vespa orientalis, F. (oriental hornet) is the chief enemy of bees in Palestine, where hundreds of swarms are attacked and destroyed each year. The queens, which alone survive the winter [*R.A.E.*, A **16** 537], are seen in the apiary in April and May, especially where water is available, but during June and July they are occupied in building their nests in holes in the ground or in walls, etc. From August to November, hornets are present in large numbers and cause serious loss. Apart from actually destroying colonies, they arrest their development and interfere with the gathering of honey.

Methods of control include protecting the entrance to the hives with wire netting of 4½ mm. mesh, and in the case of very strong colonies placing an empty story under the hive to prevent the bees from crowding round the entrance ; trapping the hornets in empty petrol tins pierced with holes in which are inserted cones of fine-mesh netting, each with an opening of ½ inch diameter, and baited with honey, meat, vinegar or stale fruit, or killing them on hanging pieces of meat by raising a vessel filled with hot water beneath them till the meat is immersed ; killing all queens approaching the hives during April and May ; and fumigating the nests with calcium cyanide [*cf.* **17** 475].

DUPONT (P. R.). **Work connected with Insect Pests and Fungus Diseases.**—*Rep. Dep. Agric. Seychelles 1932* pp. 4–5. Victoria, Seychelles, 1933.

Castor [*Ricinus communis*] was attacked in the Seychelles during 1932 by *Saissetia* (*Lecanium*) *nigra*, Nietn., *Pulvinaria grabhami*, Ckll., *Pinnaspis minor*, Mask., and *Phycita poteriella*, Zell. [*cf. R.A.E.*, A **21** 132]. As the indigenous strain of *Cephalosporium lecanii* [**15** 523] was not proving sufficiently effective against scale insects attacking coconut, a few cultures of a strain originally obtained from Mysore, where it infests Lecaniine Coccids, were sent from England by the Imperial Institute of Entomology. They were received in October and inoculated on to Lecaniine scales on several food-plants. It is not known whether this fungus will attack the Diaspine scales (*Ischnaspis* and *Pinnaspis*) that are the chief pests of coconut in the Islands [**21** 132 ; etc.].

CHATTERJEE (N. C.). **Entomological Investigations on the Spike Disease of Sandal (11). The Life-history and Morphology of** *Sarima nigroclypeata*, **Mel. Fulgoridae (Homopt.).**—*Indian For. Rec.* **18** pt. 8, 26 pp., 2 pls., 15 refs. Delhi, 15th September 1933. Price 1*s.* 3*d.*

This paper is one of a series [*cf. R.A.E.*, A **20** 600], of which nos. 2–10 give lists of the insects of various families found on sandal (*Santalum album*) in southern India in the course of a comprehensive survey.

Investigations were carried out in the field from February 1930 to December 1931 and in the laboratory from January 1932 on *Sarima nigroclypeata*, Melich., which is one of the commonest Fulgoroids on sandal and is considered a probable vector of spike disease [*cf.* **21** 363, etc.]. The technique used in the study of the biology, the various stages and the development of the antennae, legs and anal brushes are described. Both sexes are present in equal numbers, and pairing occurs more than once. Activity continues throughout the year in Madras, Coorg and Mysore. Up to 124 eggs are laid singly on the shoots in batches of 11–12, at intervals of 5–7 days in captivity. The feeding of the young nymphs on the new foliage or leaf-buds and of the older ones and the adults on the shoots affects the vitality and the growth of the plant, causing complete defoliation and the death of young shoots or plants in a short time, and contributing to the condition of thin crowns and stag-headedness prevalent in sandal forests. In certain cases in the laboratory, the new flush produced by infested plants was temporarily shortened and clustered. The egg stage lasts about 3 weeks, and the life-cycle from egg to adult is completed in about 4 months, so that there are three generations annually, which overlap owing to the length of adult life (over 3 months) and the prolonged period of oviposition. In the laboratory, broods were reared during January–April, May–August and September–December.

NARAYANAN (E. S.). **Biological Control of Insect Pests and the Possibility of utilising** *Trichogramma minutum* **Riley in India for the Control of Sugarcane Borers.**—*Agric. Live-stk India* **3** pt. 5 pp. 459–464, 10 refs. Delhi, September 1933.

The author alludes to several instances of successful biological control of insect pests by introduced parasites and briefly describes the method of mass-production of *Trichogramma minutum*, Riley. This parasite is indigenous in parts of India, where it has recently been reared from eggs of *Argyria* sp. and *Schoenobius bipunctifer*, Wlk., and might be effective against *A. sticticraspis*, Hmps., *Diatraea auricilia*, Dudg., and *D. venosata*, Wlk., if liberated in large numbers in sugar-cane fields [*cf. R.A.E.*, A **20** 153].

SUBRAMANIAM (T. V.). **Administration Report of the Entomologist for the Year 1931–32.**—*Rep. Mysore agric. Dep. 1931–32* pp. 36–41. [Bangalore, 1933.]

The mass rearing of the egg parasite, *Trichogramma minutum*, Riley, in Mysore [*R.A.E.*, A **20** 153] was continued on the eggs of the flour moth, *Corcyra cephalonica*, Stn. In a small area of sugar-cane infested by *Argyria sticticraspis*, Hmps., where 52,800 parasites were released, the number of dead-hearts found was 1,002 as against 1,627 in a control area. Hand-collection of the eggs of *Scirpophaga* [*nivella*, F.] was of some value.

An undescribed Acridid of the genus *Tarbaleus* attacked coffee in one locality, being, however, considerably less abundant than in previous years. The egg-pods were usually attached to the stems of young coffee and shade trees about 2 ins. below the surface of the soil; stirring up the soil round such trees brought the eggs to the surface, where most of them failed to hatch. The hoppers, after feeding for a short time on coffee, migrated to the foliage of the shade tree, *Macaranga roxburghi*; many were destroyed by a lead arsenate spray applied to the coffee bushes near these trees, which they were prevented from climbing by placing inverted funnels of tin round the stems. More extensive tests with one application of 10 per cent. tar distillate against *Xylotrechus quadripes*, Chevr., on coffee confirmed the results of the preceding year [**21** 28]; the percentage of plants that had to be pulled up owing to infestation was 1¼, as against 3⅝ in an untreated area. Three applications (at the beginning, middle and end of the flight season) did not lead to any markedly greater reduction in infestation. Spraying with a mixture of sodium arsenite and tar distillate against the very young larvae gave 100 per cent. mortality; the green tissue of the bark was occasionally discoloured and killed, but the plants remained healthy.

In sprays against *Idiocerus* sp. on mango, kerosene emulsion (one part of stock emulsion to 30 parts water) was found to be equal in effectiveness and cost to fish-oil resin soap. In contrast to previous results [**21** 500], an extract of the root-bark powder of *Mundulea* *suberosa* had no toxic effect on this Jassid; water extracts with soap of fruit powder of *Randia dumetorum* and of root-bark powder of *Pongamia glabra* (1 lb. to 10 and 5 gals. water) killed only 10 and 15–20 per cent. of the leaf-hoppers respectively. In tests against Aphids of water extracts of the crude powder of six plants used as fish poisons, the bark powder of *Balanites roxburghi* gave the best results, followed in effectiveness by that of *M. suberosa* and the root-bark powder of *P. glabra*. Extracts of the different parts of the plants with methyl alcohol, chloroform, ether, etc., were about ten times as toxic to insects as the crude powders.

The cactus Coccid [*Dactylopius opuntiae*, Ckll.] has spread throughout the areas of Mysore infested with *Opuntia* [*cf.* **19** 193], effectively controlling both *O. dillenii* and *O. nigricans*.

Mayne (W. W.). **Annual Report of the Coffee Scientific Officer, 1932–33.**—*Bull. Mysore Coffee Exp. Sta.* no. 10, 16 pp. Bangalore, 1933.

This report includes brief notes on the stem-borer, *Xylotrechus quadripes*, Chevr., which was abundant on coffee in Mysore, the loss caused being, however, considerably reduced where sprays of Bordeaux mixture were applied, owing to the increased leaf cover in September–October; and *Pseudococcus lilacinus*, Ckll., which was found on shoots of both *Erythrina* and coffee in southern Coorg and should be regarded as a potentially serious pest.

Meyrick (E.). **Exotic Microlepidoptera 4 pt. 14.**—pp. 417–448. Marlborough, Wilts., the author, November 1933. Price 3*s*. per pt.

Among the species dealt with are the Tineids, *Pyroderces philogeorga*, sp. n., bred from larvae feeding on *Pseudococcus perniciosus*, Newst. & Willc., in Tanganyika, and *Stathmopoda placida*, Meyr., bred from larvae feeding on the crust of *Laccifer* (*Tachardia*) *lacca*, Kerr, in Java.

Leefmans (S.) & Awibowo (R.). **Een oud contact-insecticide in een veelbelovenden nieuwen vorm.** [An old Contact Insecticide in a very promising new Form.]—*Bergcultures* **7** no. 16 pp. 441–442. Batavia, 1933.

In tests in Java with half-grown larvae of *Artona* (*Brachartona*) [*catoxantha*, Hmps.], a mortality of 95 per cent. was observed the day after application of a pyrethrum dust insecticide of German origin "Urania normal," as against 17 per cent. with "Forestit" [*R.A.E.*, A **20** 314, etc.]. Old and young larvae of *Crocidolomia* [*binotalis*, Zell.] and young larvae of *Hellula* [*undalis*, F.] in cabbages died in one day. Leaf Aphids were cleared from cabbage, and an excellent result was obtained against thrips. Mixed with an equal quantity of lime, this dust killed an almost full-grown larva of *Artona* and half-grown larvae of *Parasa lepida*, Cram., in one day.

Caresche (L.). **Note sur les insectes appelés "pucerons du riz" dans le sud-indochinois et les moyens de lutte à leur opposer.**—*Bull. econ. Indochine* **36** pp. 488–510, 4 pls., 12 refs. Hanoi, 1933.

This is a detailed account of the bionomics and control of the Delphacids and Jassids attacking rice in Indo-China, with additional information on them from the literature. Two Delphacids have been observed, *Nilaparvata lugens*, Stål, and *Sogata furcifera*, Horv. (*pallescens*, Dist.), and their distribution is discussed and all stages described. The eggs of *N. lugens* are laid in the leaf tissues in batches of from 5 to 30 ; one female in the insectary oviposited 21 times in 14 days and another 45 times in 16 days. The eggs hatch in about 6 days, nymphal development requires about 15 days and the adults live for about 3 weeks. Both adults and nymphs usually remain on the lower parts of the plants near the water, feeding on the sap and secreting honey-dew. They seldom leave a plant until it is completely exhausted, though they may sometimes be carried accidentally to adjacent ones by wind or water. The bionomics of *S. furcifera* are very similar [*cf. R.A.E.*, A **18** 555, 557, 593], differing only in the lengths of the stages. In the laboratory, this species completed development on *Carex* spp.

Nephotettix bipunctatus, F., and *N. apicalis*, Motsch., which the author considers to be a distinct species, occur frequently on rice in southern Indo-China, but in 1931–32 they were generally less injurious than *Nilaparvata*. These Jassids attack a number of grasses and other herbaceous plants growing in marshy ground, and they are particularly abundant in rice-fields where the soil is fertile and the vegetation luxuriant. The eggs, which are laid under the epidermis, preferably at the base of the leaf-sheaths, hatch in 4 days, and the nymphal stage lasts 13–20 days. The nymphs remain during the day on the lower surface of the leaves, from which they suck the sap, secreting large quantities of honey-dew. From 4 to 5 annual generations are recorded from India [**8** 473].

Nilaparvata is attacked by *Cicindela sexpunctata*, F., and numerous Coccinellids, notably *Verania* (*Alesia*) *discolor*, F., which prey on the larvae and on those of the Jassids, and also by Hymenopterous egg parasites, the percentage of parasitism in October 1932 having been as high as 80. Mites were found among the parasitised eggs, but their rôle is uncertain. A female of *S. furcifera* was observed in 1932 with indications of Dryinid parasitism.

These insects may be controlled by capturing in nets, the construction and use of which are described, or, if they are very abundant, by applying oil to the surface of the water in the rice-field at the rate of about a gallon to the acre and shaking them off the plants into it [**21** 552]. The Jassids, though not the Delphacids, are readily attracted to light-traps. Temporary draining of the rice-fields is an alternative method for the control of the Delphacids in view of their need of water. Preventive measures suggested are clean cultivation and destruction of self-sown rice plants after harvest. Water from an infested field should never be allowed to flow into an uninfested one.

CHAN (Kwai-shang). **A Biological Study of an Orange-brown Galerucid Pest of Cucurbits.**—*Lingnan Sci. J.* **12** no. 4 pp. 577–592. Canton, China, 16th October 1933.

Investigations were begun in the summer of 1932 on the biology and control of a Galerucid, probably *Rhaphidopalpa femoralis*, Motsch., which is one of the chief pests of cucurbits in Kwangtung, China, where it occurs up to an altitude of 2,500 feet. It is also found in Kwangsi. A list is given of numerous wild and cultivated plants, representing several different families, on which it feeds. As many as 30 per cent. of cucurbit seedlings may be lost in early spring and 60 per cent. or more in summer by defoliation or damage to the stems near the ground. On older plants, the beetles attack the leaves, flowers and fruits. The larvae either infest the roots (sometimes boring into them) or make their way to the surface and attack leaves or fruit in contact with the soil. A fruit weighing 1·2 oz. contained 11 larvae, and larger ones 24–36. The various stages of this Galerucid and the technique of rearing it are described.

The adults hibernate among rubbish in the field and in cracks in the earth ; activity ceases at 53°F. and becomes general at 65°. Pairing first occurred at the end of February in the field and the laboratory. Females of the earlier broods sometimes began to oviposit within 10 days of emergence, but those of the autumn brood not until the end of March or the beginning of April. The eggs are laid singly or in small batches in damp crevices of the soil near the food-plant. Ten females caught in the field laid an average of nearly 600 each. In 1933, the first batch was laid on 20th March and the last on 16th October. The first larva was observed in the laboratory on 12th April. The egg stage lasted 8–25 days, the larval 19–36, the prepupal 5–9 and the pupal 7–13. The pupal period is passed in a cell about 3–10 ins. away from the food-plant and 2–4½ ins. below the soil surface. Females were more numerous than males throughout the year and also lived longer. There were three overlapping generations, which in the laboratory occupied 50–65, 36–42 and 50–59 days in spring, summer and autumn respectively.

Natural enemies observed included Nematodes, which infested all stages, cercariae found on or in the eggs, a Dipterous parasite of the adults and larvae, Carabids, *Cicindela aurulenta*, F., ants, earwigs, parasitic mites, toads and frogs.

In experiments with sprays of Bordeaux mixture used alone as a repellent or in combination with calcium arsenate, the best results were obtained with 0·75 per cent. calcium arsenate in Bordeaux (3 : 3 : 50), the value of the increased yield of the sprayed plants being nearly double the cost of the spray and labour for applying it. A laboratory test suggested that the calcium arsenate might have been effective at a concentration of 0·4 per cent. Clean cultivation should be practised after harvest, though some old fruits and vines may be left as traps. A heavy crop should be sown as early as possible, and fertilisers may be applied to encourage vigorous growth. The beetles may be prevented from ovipositing near the plants or feeding at the base of the stems by packing the soil into a hard crust round the seedlings after rain.

ARAKAWA (Y.). **Studies on the Peach Weevil in South Manchuria.** [*In Japanese.*]—*Res. Bull. agric. Exp. Sta. S. Manchuria Rly Co.* no. 12 pp. 55–78, 2 pls. Yugakujo, Manchuria, July 1933. (With a Summary in English.)

Rhynchites bacchus, L., is a serious pest of peach in southern Manchuria. Other food-plants include plum, apricot, etc., and the adults also attack apple and pear, but do not oviposit in the fruit. The adult weevils are active from May to July, feeding on the flower-buds and young fruits of peach, and sometimes injuring 100 per cent. of them. The eggs are deposited in the fruits [*R.A.E.*, A **17** 429] in May–June and hatch in about a week. The full-grown larvae leave the fruits and hibernate underground, but do not pupate till September of the following year; the adults emerge on an average 16·3 days later, but remain dormant underground until next spring. In a few larvae, especially those boring in peach seeds, development is retarded, the stage being prolonged a year more. A female lays an average of 39·4 eggs during 13·5 days, beginning to oviposit a day after pairing. Though 2 or 3 eggs are occasionally laid in a single hole, only one larva usually completes its growth in one fruit. Collecting the infested fruits and ploughing in autumn and winter are recommended for control.

HORI (M.). **Studies on the Clover Leaf-beetle,** *Luperodes praeustus* **Motschulsky, in Southern Saghalien.** [*In Japanese*].—*Rep. Saghalien cent. Exp. Sta.* (1) no. 2,105 pp., 4 figs., 4 pls., 24 refs. Konuma, March 1932. (With a Summary in English.)

The Galerucid, *Luperodes praeustus*, Motsch., is one of the most injurious insects in Southern Sakhalin [*R.A.E.*, A **17** 706], attacking numerous vegetables and other plants, a list of which is given. It occurs in Shikoku together with *L. discrepans*, Baly, which is also widely distributed in Hokkaido, Honshu and Kyushu. The eggs overwinter, most of them hatching in June, and the larval stage lasts 24–44 days, with an average of 26. The pupal period, which is passed in an earthen cell in the ground, occupies 5–22 days with an average of 13, emergence beginning in the middle of July and reaching its maximum in the latter part of August. Observations indicate an adult life of about 30 days for females and 23 for males, or possibly longer on suitable food-plants such as carrots, clover, swedes, etc. The female lays an average of 50 eggs over a period of 10–14 days; they are deposited singly in crevices of clods at the base of perennial plants such as clover and mugwort (*Artemisia*). This beetle is reported to be an indiscriminate feeder, but in the author's investigations different plants were attacked in varying degrees.

Control measures recommended consist of digging trenches round infested fields to prevent the larvae from migrating, spraying with lead arsenate against the larvae and adults and with nicotine sulphate and soap against the eggs, hand-collection of the adults, autumn ploughing, clean cultivation, and careful rotation and distribution of crops.

TAMANUKI (K.). **Ecological Studies upon the Spruce-attacking Bark-beetles in Southern Saghalien. Part I. On the Bark-beetle Fauna of dying Spruce in Southern Saghalien.** [*In Japanese.*]—*Rep. Saghalien cent. Exp. Sta.* (2) no. 3, 54 pp., 7 figs., 4 pls., 14 refs. Konuma, March 1933.

Brief descriptions are given of 15 species of Scolytids now known to occur on *Picea jezoensis*, a valuable forest tree, in Southern Sakhalin. *Ips japonicus*, Niij., is the most injurious, preferring trees with thick, rough bark and attacking the middle parts of the trunks and branches, more commonly on the sunny side. In Hokkaido [*cf. R.A.E.*, A **17** 648] it is also found near the tips. Damage by this species to slightly weakened trees is followed by infestation by *I.* (*Pityogenes*) *chalcographus*, L., which is commonly found near the tips of the trunk and branches and attacks rather young trees, and then by *Polygraphus gracilis*, Niij., which prefers stems with thin bark, being found mostly in the basal and middle parts, both on the sunny and shady sides. Damage by *Dendroctonus micans*, Kug., is confined to the basal parts of the trunks, and *Dryocoetes rugicollis*, Egg., infests them up to 13–17 feet from the ground. *Cryphalus piceae*, Ratz., occurs in the apical parts of rather young trees, on both sunny and shady sides, and *Xyloterus* sp. in the middle parts of the trunks.

OMORI (N.). **On the Seasonal History and Hibernation of** *Parnara guttata*, **Bremer et Grey.** [*In Japanese.*]—*Dobuts. Zasshi* **45** no. 537 pp. 303–324, 2 pls. Tokyo, July 1933.

In central Honshu, the Hesperiid, *Parnara guttata*, Brem., which attacks rice and grasses, has three annual generations and a partial fourth, the adults of the main broods emerging in early June, mid-July, and from mid-August to mid-September. The females live 4–6 days, laying over 80 eggs 2–3 days after emergence, while the males live 3–4 days. The eggs are laid at about 5–6.30 p.m. and hatch in 3½–20½ days, according to temperature, at about 7 a.m. The larvae usually moult 4 times and pupate after 20–30 days, but those of the overwintering generation moult 5 or 6 times, hibernating in the 3rd–5th instars. The pupal stage lasts 8–21 days. Larvae bred at a warm temperature from 17th November moulted 5 or 6 times, but reached the adult stage without becoming dormant.

YOKOYAMA (K.) & KUROSAWA (T.). *Notolophus* (*Orgyia*) *thyellina*, **Butl., a Pest of Mulberry.** [*In Japanese.*]—*J. seric. Soc.* **4** no. 3 pp. 225–248, 3 pls. Tokyo, August 1933.

Descriptions are given of all stages of the Lymantriid, *Orgyia* (*Notolophus*) *thyellina*, Butl. The larvae feed on the leaves of mulberry, pear, cherry, plum, apple, etc., completing their growth in 20–40 days and pupating in crevices in the bark or in rolled leaves. There are two generations a year in northern Japan and 3 or occasionally 4 near Tokyo. The adults, which live about a week, emerge in June, August and October. Pairing takes place soon after emergence, and the females are very inactive. The eggs, which hatch in 10–15 days, are laid in a single layer on the lower surface of leaves or on the bark or cocoons. One female deposits 400–600 eggs in one or several batches.

KAMIYA (K.). **On the Larva of the Buprestid,** *Poecilonota masudai*, **Kano.** [*In Japanese.*]—*Kontyû* **7** no. 4 pp. 170–172, 3 figs. Tokyo, October 1933.

Descriptions are given of the adult and larva of the Buprestid, *Poecilonota masudai*, Kano, which attacks a valuable cypress, *Chamaecyparis obtusa*, in Yakushima, an island south of Kyushu.

On the Introduction and Liberation of the Parasites of *Grapholitha molesta*, **Busck.** [*In Japanese.*]—*Kontyû* **7** no. 4 pp. 193–194. Tokyo, October 1933.

Macrocentrus ancylivora, Roh., *Glypta rufiscutellaris*, Cress., and *Pristomerus ocellatus*, Cush., were introduced into Japan from the United States in May and June 1932 against *Cydia* (*Grapholitha*) *molesta*, Busck, and the first two were liberated in heavily infested orchards.

NAWA (U.). **On** *Chlorops oryzae*, **Mats.** [*In Japanese.*]—*Insect World* **37** no. 7 pp. 228–231. Gifu, Japan, July 1933.

The larvae of *Chlorops oryzae*, Mats., injure rice stalks in Hokkaido and northern Honshu, sometimes causing serious damage. There are apparently 2 or 3 generations a year at Gifu [*cf. R.A.E.*, A **17** 344].

SONAN (J.). **List of Insect Pests of the Tea Plant in Japan.** [*In Japanese.*]—*Insect World* **37** nos. 8–9 pp. 265–270, 257–263 [*sic*]. Gifu, Japan, August–September 1933.

A briefly annotated list is given of 52 insects and 5 mites infesting tea in Japan, including *Gracilaria theivora*, Wlsm., *Homona coffearia menciana*, Wlk., *Adoxophyes privatana*, Wlk., *Psyche viciella*, Schiff., and *Xyleborus germanus*, Bldf.

NAWA (U.). **On** *Monolepta nigrobilineata*, **Motsch.** (**Preliminary Report.**) [*In Japanese.*]—*Insect World* **37** no. 10 pp. 293–296. Gifu, Japan, October 1933.

The Galerucid, *Monolepta nigrobilineata*, Motsch., is widely distributed in Japan, the adults feeding on the leaves of soy beans [*R.A.E.*, A **14** 329]. The food of the larvae was hitherto unknown [*cf.* **19** 445], but the author has recently discovered them feeding on the root nodules.

NEWMAN (L. J.), ANDREWARTHA (H. G.) & O'CONNOR (B. A.). *Thrips imaginis* (**Bagnall**).—*J. Dep. Agric. W. Aust.* (2) **10** no. 3 pp. 361–373, 3 figs. Perth [W.A.], September 1933.

Thrips imaginis, Bagn. [*R.A.E.*, A **20** 374, 601], is the most serious pest of deciduous fruit trees in Western Australia. It is chiefly injurious in spring and early summer, though less severe outbreaks sometimes occur in autumn. Investigations on the factors responsible for outbreaks were begun in 1932. Most of the work was done at Mt. Barker (in the extreme south of the State) during June–November, though comparative observations were also made in the more northerly fruit-growing areas, and samples of infested material were obtained from all districts during February–November. The thrips occurred in moderate numbers during February–September. On 20th October in Bridgetown and the area to the north, when the shade temperature suddenly rose to 87°F., an average of 24 thrips to a blossom was recorded on apple ; by 3rd November, it had fallen to 12. This outbreak occurred after most of the fruit had set, but considerable damage was caused to late blossoms. Immature stages were swarming in the late flowers and in the partly-closed calyces of the small fruits. Fruit was set by blossoms that were well out at the beginning of the attack, but those attacked in the pink stage were totally destroyed. In the Mt. Barker area, where such high temperatures did not occur, a maximum of 14 thrips per blossom was recorded on 30th October. No relation was found to exist between the flowering of *Eucalyptus* and the abundance of the thrips, nor was Cape-weed (*Cryptostemma calendulaceum*) ever heavily infested [*cf.* **20** 602]. The chief food-plant was *Acacia*, which flowers profusely every year on land adjacent to orchards.

At Mt. Barker, thrips were collected first from bush flowers, and later from as wide a variety of food-plants as possible, with a view to correlating their numbers with meteorological conditions. *T. imaginis* was found to breed throughout the year, but the rate is slower in winter, when parthenogenesis does not appear to occur, males being present in all samples. Its numbers increased gradually until 20th October, when, following a soil temperature of 80°F., the number per blossom increased from 0·3 to 3·7; after remaining at about 3 during a cloudy period, it increased again on the 27th, following a soil temperature of 78°F., to 12·2, finally dropping to 4·5 on 7th November. The relative scarcity of the thrips in this area during 1932 is thought to have been due largely to unfavourable weather conditions during September–October. There is some evidence of high mortality amongst the newly-emerged females in October.

A list is given of the Thysanoptera collected during the year and their food-plants, the most numerous being *Isoneurothrips australis*, Bagn., *T. tabaci*, Lind., *Odontothripiella australis*, Bagn., *Frankliniella insularis*, Frankl., and *T.* (*Microcephalothrips*) *abdominalis*, Cwfd.

SAMUEL (G.) & BALD (J. G.). **Tomato Spotted Wilt on Tobacco.**—*J. Dep. Agric. S. Aust.* **37** no. 2 pp. 190–195, 12 figs., 1 ref. Adelaide, 15th September 1933.

In South Australia, spotted wilt of tomatos, a virus disease transmitted by *Frankliniella insularis*, Frankl. [*R.A.E.*, A **18** 666] and *Thrips tabaci*, Lind. [**19** 498], also attacks tobacco, of which it is a potentially serious disease that occasionally infects more than 5 per cent. of the plants. The symptoms in tobacco are described. Plants liable to infection [**20** 212], including dahlia, should not be grown near seed-beds or fields of tobacco, and solanaceous weeds such as black nightshade [*Solanum nigrum*] and infected tobacco plants should be destroyed.

PESCOTT (R. T. M.). **Codling Moth Control. Experiments at Harcourt.**—*J. Dep. Agric. Vict.* **31** pt. 10, pp. 484–489, 6 figs. Melbourne, October 1933.

Experiments in Victoria in 1932–33 on the control of *Cydia pomonella*, L., on apple confirm those of previous years as to the superior results obtained by substituting white oil emulsion for lead arsenate after the two calyx sprays [*R.A.E.*, A **20** 156; etc.]. Baits of 10 per cent. vinegar solution proved more effective in trapping moths than fermented apple juice; the addition of geraniol to either of these reduced the catch. The number of larvae caught in bands treated with beta-naphthol was slightly lower than that in hessian bands, but every larva caught in the former was destroyed, whereas the latter have to be removed and the larvae killed.

ATHERTON (D. O.). **Experiments with Baits for the Control of certain Cotton Pests.**—*Qd agric. J.* **40** pt. 3 pp. 183–190, 2 graphs, 5 refs.; also as *Pamph. Dep. Agric. Stk Qd* no. 12, 10 pp., 2 graphs, 5 refs. Brisbane, 1st September 1933.

Experiments were made in Queensland to test the possible value for the control of Lepidopterous cotton pests of catching the adult moths with baits of molasses or honey and water (1 : 7). The addition of 15 drops of kerosene per ½-gallon pail of molasses bait to retard evaporation reduced the catch of 4 pails in 5 weeks from 177 moths to 147.

A bait of honey and water with the addition of ¼ lb. quassia chips per pail was inferior to one of molasses and water with ¼ oz. sodium arsenite, which remained effective for nearly 4 weeks despite the prevailing high temperature and caught (in 8 pails during 5 weeks) 1,202 adults of *Antarchaea chionosticta*, Turn. (green looper) [*cf. R.A.E.*, A **21** 105, 185], 86 of *Heliothis obsoleta*, F., and 740 other moths. No bait tried, however, would be effective in controlling *H. obsoleta*, the most destructive species. No very significant results were obtained by adding 15 drops per pail of amyl acetate or ethyl acetate as an attractant. More moths were caught in containers raised 2 ft. from the ground than in those on the ground, but the percentage of *Antarchaea* was less.

SMITH (J. H.). **Tobacco Pests.**—*Ent. Leafl. Dep. Agric. Stk Qd* no. 26, 31 pp., 10 pls. **Seed-harvesting Ants.**—*Qd agric. J.* **40** pt. 3 pp. 191–192; also as *Adv. Leafl. Dep. Agric. Stk Qd* no. 2, 2 pp. Brisbane, 1st September 1933.

Much of the information given in the first of these papers (which are extracts from "Tobacco Growing in Queensland" by N. G. R. Pollock, J. H. Smith and L. F. Mandelson, issued by the Department of Agriculture and Stock, 18th May 1933) is similar to that in a paper previously noticed [*R.A.E.*, A **19** 715]. Seed-harvesting ants, *Phytometra* (*Plusia*) *argentifera*, Gn., *P.* (*Plusia*) *chalcites*, Esp., *Prodenia litura*, F., *Phthorimaea heliopa*, Lw., and *Lasioderma serricorne*, F., are now included among the major pests, and the false wireworm, *Dasus* (*Gonocephalum*) sp., among the minor ones.

The second paper reproduces the information given in the first on the damage caused to tobacco seed-beds by ants. *Monomorium* spp. and *Pheidole variabilis*, Mayr, which only forage during the cooler hours of the day, collect the seeds from the ground, so that few, if any, germinate there. *P. longiceps*, Mayr, which appears to be continuously active, and possibly some of the other species, also destroys young seedlings by severing the cotyledons. The actual loss is perhaps less important than the derangement of seasonal programmes for planting. Newly-sown beds may be protected by covering them with a layer about ⅛ in. deep of medium-grade river sand (6 gals. per 100 sq. ft.), which may in addition have a beneficial effect on the establishment of the root system. If sand is not available, light sandy soil from previously uncultivated ground may be used, but it involves a risk of soil-caking and of introducing weeds or disease. The species that attack the cotyledons may be controlled by baits of Paris green and maize meal (1 : 50) with sufficient water to produce a crumbly mash, broadcast at the rate of 12 oz. per 100 sq. ft.; protection may be necessary for three weeks after germination, and several applications are sometimes required.

SIMMONDS (H. W.). **Limits to practical Biological Control.**—*Agric. J. Dep. Agric. Fiji* **6** no. 1 pp. 3–5. Suva, August 1933.

In view of the success achieved in the biological control of various noxious insects and plants in Fiji [*R.A.E.*, A **20** 722, etc.], the author briefly discusses some of the factors that may limit its application, such as the habits and possible resistance of a particular pest, the occurrence of natural enemies of the beneficial insect utilised, and the overabundance of alternative hosts or food-plants of the latter or their absence, the one condition reducing its effectiveness and the other its chance of survival.

An Investigation of the Banana-scab Moth, *Nacoleia octasema*, Meyr., and its Parasites, in Java, and the Introduction of one of its Parasites into Fiji.

TAYLOR (T. H. C.). **I. Investigations in Java.**—*Agric. J. Dep. Agric. Fiji* **6** no. 1 pp. 5–13, 1 ref. Suva, August 1933.

SIMMONDS (H. W.). **II. Breeding Work in Fiji.**—*T.c.* pp. 13–14.

In the course of these investigations, it was found that in Java the eggs of *Lamprosema* (*Nacoleia*) *octasema*, Meyr. (banana scab moth) were laid in batches of about 15 on flower-spikes of banana that were about to open, and that the larvae penetrated beneath the bracts and fed on the flowers, as many as 70 being found on one spike ; even older larvae were very rarely found on the fruit [*cf. R.A.E.*, A **5** 278], though they fed readily on the skins of ripe fruit in captivity and developed normally. More pupated under the old leaf-bases enfolding the stem than on the ground. The adults emerged between 8 and 9 p.m. ; pairing generally occurred on the next night and oviposition on the two following nights, after which the females lived about 18 hours. One female usually laid 80–120 eggs, the maximum being 194. The moths fed readily on diluted honey. The average life-cycle was : incubation period, 3–6 days ; larval (5 instars), 16·5 on flowers or 11·5 on fruit skins ; prepupal, 1·3 ; pupal, 8·1. In breeding experiments, fertilised females were placed singly in glass tubes, into each of which, when the black heads of larvae became visible among the egg-masses, 2 banana flowers were inserted ; 5 days after hatching, the larvae were transferred (about 200 to each) to flat wooden boxes (14 × 14 × 3 ins.) with wire-gauze lids and bottoms, raised on short legs and divided by a partition $1\frac{1}{2}$ ins. high into two compartments, one containing banana skins and the other dry soil for pupation. Without the soil, many prepupae and pupae were eaten by larvae.

Only three parasites were observed, all being rare. The female of a Bethylid, *Goniozus* sp., having paralysed a third-instar larva, laid on it 3–5 eggs, which hatched in $2\frac{3}{4}$–3 days. The larvae fed externally on the host for $2\frac{1}{2}$–3 days and then pupated in cocoons inside the host-cocoon, the adults emerging after $7\frac{1}{2}$–9 days. A Braconid, *Apanteles* sp., laid 1 egg in each host larva (first or second instar) ; the incubation and larval periods totalled 9–12 days, and the prepupal and pupal (in a cocoon within that of the host) 6–7. Individual females laid as many as 47–65 eggs. An Ichneumonid, *Cremastus* sp., parasitised larvae in the first three instars ; sometimes the same larva was attacked more than once, but not more than one parasite developed. The average egg-capacity probably exceeds 70. The life-history resembled that of the Braconid, the incubation and larval periods totalling 11–12 days and the prepupal and pupal 10. *Cremastus* more frequently parasitised an unidentified Tineid, the larvae of which tunnelled in the sheathing bracts of the flower-spikes, afterwards constructing tough, flattened cases, in which they developed and eventually pupated, after feeding on the flowers and bracts. *L. octasema* was also parasitised in captivity, though not in the field, by *Apanteles tirathabae*, Wlkn.

Goniozus was considered unsuitable for biological control owing to its probably wide host-range, and *Cremastus* was preferred to *Apanteles* as being parthenogenetic, producing females only. A small consignment of this Ichneumonid was taken to Fiji, but owing to the failure of the host to pair on the voyage, almost the only material actually introduced consisted of a few survivors of the original generation. The second paper deals with the breeding of this parasite in Fiji. The life-history of the host was here somewhat different, the eggs being generally laid on the leaves surrounding the spike [*cf.* **20** 605]. The adults were placed singly in small tubes with several host larvae, and the latter, when parasitised, were removed to cages with abundant food. Small colonies, amounting to 540 parasites in all, were liberated at scattered sites, but it was anticipated that some time would have to elapse before any recoveries could be made.

SIMMONDS (H. W.). **Annual Report of the Government Entomologist, 1932.**—*Ann. Bull. divl Reps Dep. Agric. Fiji 1932* pp. 26–28. Suva, 1933.

In Fiji, banana plants from suckers immersed in water for the control of *Cosmopolites sordidus*, Germ. [*R.A.E.*, A **20** 605, etc.] gave a higher yield and ratooned earlier than untreated ones. The weevils should be collected from sections of stems or corms of banana used as traps [**20** 723] at least every other day ; no preference was shown for decaying material, but the traps remained effective for 10 or more days. Both sexes, particularly the females, migrated frequently and rapidly, especially during warm, heavy rains in November–January. In experiments with vegetable oil emulsions as ovicides against *Lamprosema* (*Nacoleia*) *octasema*, Meyr., on banana, the most satisfactory results were obtained by incorporating paradichlorobenzene, the mixture acting as a repellent and also killing the eggs, which were lightly attacked by two parasites. A bait previously used [**20** 722] gave successful results against *Dacus passiflorae*, Coq., and *D. xanthodes*, Broun, on *Citrus*, the proportion of females to males captured being 10 : 1. Bags of cellophane tied round granadillas [*Passiflora*] to protect them from these fruit-flies stuck to them in wet weather, but white cotton ones were highly successful. Oleic acid did not give encouraging results as a bait for trapping *Necrobia rufipes*, DeG., in copra stores. Considerable damage was caused to rice in June by larvae of *Cirphis unipuncta*, Haw. Investigations carried out in connection with the biological control of the weed, *Stachytarpheta jamaicensis*, showed that the older plants are destroyed by *Aulacaspis* (*Diaspis*) *pentagona*, Targ. Several species of dry-wood termites caused serious damage to timber in Suva.

PEMBERTON (C. E.). **Poison Bait for Armyworms and Cutworms.**—*Hawaii. Plant. Rec.* **37** no. 2 p. 87. Honolulu, 1933.

A bait, consisting of 10 lb. bagasse, 20 lb. molasses, 1 lb. white arsenic, ½ lb. casein (Kayso) and 2 U.S. qts. water, is recommended against armyworms attacking sugar-cane in Hawaii. The casein improves the coherence of the bait and prevents it from being scattered and washed away by drenching rain. An arsenical dust [*R.A.E.*, A **21** 347] is probably more effective for the control of *Spodoptera mauritia*, Boisd., but the bait should be useful against *Cirphis unipuncta*, Haw. (which is chiefly injurious during periods of heavy rain), as the larvae are often found on the ground during the day.

Bondar (G.). **Relatorios apresentados ao Governo sobre as condições biologicas de varias lavouras do Estado, procedidas no Laboratorio de Patologia Vegetal—de 1929 a 1932.** [Reports to the Government of the State of Bahia, Brazil, on the Biological Conditions of various Crops in the State observed by the Laboratory of Plant Pathology from 1929 to 1932.]—*Bol. Secret. Agric. Bahia* 1932 no. 11–12 pp. 31–97. Bahia, 1933.

These reports include records of the occurrence of various insect pests, many of which have already been noticed from other sources.

Bates (M.). **Insect Parasites of** *Citrus* **in Central America.**—*Florida Ent.* **17** nos. 2-3 pp. 29–32, 45–47, 6 refs. Gainesville, Fla, August–October 1933.

Observations on insects attacking *Citrus* in Guatemala, Honduras and Salvador showed that the following species are generally distributed : *Schistocerca paranensis*, Burm., *Frankliniella insularis*, Frankl., *Toxoptera aurantii*, Boy., which has been observed only on the Pacific coast, *Lepidosaphes beckii*, Newm., *Saissetia coffeae*, Wlk. (*hemisphaerica*, Targ.), which was more abundant on coffee, *Papilio anchisiades*, Esp., the Hesperiid, *Eantis pallida*, Feld., and the ant, *Solenopsis geminata*, F., which constructs galleries over the trunks and attacks the terminal shoots, severely checking growth. Of the leaf-cutting ants, *Atta insularis mexicana*, F. Smith, was found in Salvador, *A. sexdens*, L., in Guatemala and *A. cephalotes*, L., in Honduras. Other pests in Honduras were *Ceroplastes floridensis*, Comst., *Icerya montserratensis*, Ril. & How., *Lepidosaphes gloveri*, Pack., *Selenaspidus* (*Pseudaonidia*) *articulatus*, Morg., the Arctiid, *Ecpantheria icasia*, Cram., and the bees, *Trigona amalthea*, Ol. and *T. silvestriana*, Vachal, both of which strip off the bark and chew the terminal leaflets of various trees, being especially injurious to *Garcinia* spp., breadfruit [*Artocarpus incisa*] and banana. *Myzus persicae*, Sulz., *Icerya purchasi*, Mask., and *Pseudococcus citri*, Risso, which is sometimes a severe pest of coffee, were observed only in Guatemala. *Papilio thoas*, L., and *P. cresphontes*, Cam., were common on the Caribbean coast, and *Parlatoria pergandei*, Comst., was collected there and also on the Pacific slope. *Anastrepha ludens*, Lw., occurred on the Pacific slope of Guatemala from sea level to 5,000 ft., but on the Atlantic side not below 600 ft. It is typically a pest of sour oranges, but occurs rarely in sweet ones and also in fruits of *Casimiroa edulis* and mango.

Bates (M.). **Notes on West Indian Trypetidae (Diptera).**—*Bull. Brooklyn ent. Soc.* **28** no. 4 pp. 160–172, 2 figs., 26 refs. Lancaster, Pa, 6th November 1933.

These notes include a reference to *Anastrepha acidusa*, Wlk., which the author believes to have been wrongly recorded in the West Indies as *A. fraterculus*, Wied. It was bred from fruits of *Spondias* spp. and, less frequently, mango in Cuba, and also occurs in Porto Rico and Dominica.

Engelhardt (G. P.). **The Fall Canker Worm** *Alsophila pometaria* **Peck in Westchester County, N.Y.**—*Bull. Brooklyn ent. Soc.* **28** no. 4 pp.172–173. Lancaster, Pa, 6th November 1933.

An unusually severe outbreak of the Geometrid, *Alsophila pometaria*, Harr., in a district of New York caused defoliation of numerous shade trees, besides apple, etc. The adults had been abundant in the preceding December-January, but control measures (spraying with lead arsenate) were undertaken too late to be effective.

WALKER (F. W.). **The Pecan Shuckworm.**—*Bull. Fla agric. Exp. Sta.* no. 258, 18 pp., 4 figs., 7 refs. Gainesville, Fla, April 1933. [Recd. November 1933.]

All stages are described of *Enarmonia* (*Laspeyresia*) *caryana*, Fitch (pecan shuckworm), with notes on its bionomics [*cf.* *R.A.E.*, A **18** 548] and the damage it does [**6** 226]. In northern Florida, there are two annual generations, adults of the second generally emerging in late March or early April ; in the south of the State, there are four, or sometimes five, overlapping generations. Adults have been found in the field from 18th February to 5th October. The larval stage lasts 19–32 days in summer and 110–150 in winter ; the pupal period is 4–11 days in summer, and in early spring is usually 2–4 weeks, but sometimes several months. Natural enemies include Tachinid and Ichneumonid parasites, *Trichogramma minutum*, Riley, and Carabid larvae (*Harpalus* sp.) and the predacious mite, *Pediculoides ventricosus*, Newp., which are found in husks on the ground in winter.

Figures are given showing the extent of damage. The percentage of infested nuts of different varieties ranged from 28·6 to 81·2. Experiments in which infested husks were buried at different depths in the soil showed that ploughing in the fallen husks would give a much better control of pupae than of larvae, as some of the latter left the buried husks and pupated near the surface. This operation should therefore be delayed till early in March [*cf.* **17** 85 ; **20** 648] ; infestation in an orchard so treated averaged only 22 per cent., as against 58·6 per cent. in controls. It is more effective, however, to burn the husks [**18** 549, etc.]. Alternative food-plants are black walnut [*Juglans nigra*], which is occasionally attacked, and *Hicoria* spp., which are sometimes very highly infested (up to 95 per cent. in *H. aquatica*) and should be eliminated from the neighbourhood of pecan orchards.

PETTIT (R. H.). **The principal Grape Insects of Michigan.**—*Spec. Bull. Mich. agric. Exp. Sta.* no. 239, 19 pp., 13 figs., 5 refs. East Lansing, Mich., July 1933. [Recd. November 1933.]

Brief accounts are given of the bionomics and control of the more important vine pests in Michigan, some of which have been dealt with in a previous bulletin [*R.A.E.*, A **14** 355].

The Eumolpid, *Fidia viticida*, Walsh (grape rootworm) may be controlled by cultural measures [**6** 163], or by one application to the upper surface of the leaves of a spray of calcium arsenate in water or Bordeaux mixture (2 lb. : 100 U.S. gals.) after the first appearance of the beetles in late June or early July. *Haltica* (*Altica*) *chalybea*, Ill. (grape-vine flea-beetle) [**9** 309] is partly controlled by the arsenical sprays used against *Polychrosis viteana*, Clem. (grape-berry moth) [*cf.* **14** 355 ; **20** 361].

Climbing cutworms [*cf.* **20** 463] are important pests in vineyards, especially in cold, wet springs, probably because they are less affected by the cold than their natural enemies. There are apparently three generations a year ; the larvae of the third overwinter in grass sod, becoming active again in spring, when they climb up the vines in the evening and feed on the new growth and opening buds at night. They descend the vines in the early morning and hide during the day. Pupation occurs in the soil. The later broods do not feed on vine, which is then too tough. Vineyards should be cleanly cultivated and should not be surrounded by scrub and grassland. Wide adhesive bands should be placed at the bases of the vine-stocks and on the supporting wires. In addition, poisoned bran baits (1 bushel bran, ½ U.S. gal. molasses, 1 lb. white arsenic or Paris green, 2–3 oz. amyl acetate (banana oil) and a little water) should be scattered over the surface of the soil in the vineyards. Autumn ploughing of grass in the vicinity destroys a large proportion of the larvae.

The adults of the Melolonthid, *Macrodactylus subspinosus*, F. (rose chafer) [*cf.* **4** 392] feed on the tender foliage, blossoms and young grapes. A spray of calcium arsenate (3 lb. to 100 U.S. gals.) is of some value against them and is possibly improved by the addition of 1 U.S. gal. molasses as a bait [*cf.* **15** 262]. A combination of molasses and Bordeaux mixture, however, is liable to scorch the foliage. Some success has been obtained by using Volck oil (1 : 100) as a repellent.

Oxyptilus periscelidactylus, Fitch (grape plume moth) has two generations a year. The larvae of the first web together the new growth, forming a shelter in which they pupate, and the adults emerge in July; the leaves and grapes are better able to resist attack by the second. This Pterophorid is of minor importance, usually being kept in check by the sprays used against *P. viteana*; where noticeable damage is done, control may be obtained with a spray of lead arsenate applied before blossoming, or by hand-destruction of the larval shelters.

McDaniel (E. I.). **Some Wood Borers attacking the Trunks and Limbs of Deciduous Trees and Shrubs.**—*Spec. Bull. Mich. agric. Exp. Sta.* no. 238, 37 pp., 31 figs., 10 refs. East Lansing, Mich., July 1933. [Recd. November 1933.]

Notes are given on the bionomics and control of a representative selection of the numerous insects that bore in shade trees in Michigan.

Dufrenoy (J.). **Notes sur le traitement des arbres fruitiers aux Etats-Unis.**—*Rev. Zool. agric.* **32** no. 5 pp. 77–89, 1 pl. Bordeaux, May 1933. [Recd. November 1933.]

This paper presents an outline of recent progress in the United States in the control of pests of fruit trees, chiefly *Cydia* (*Carpocapsa*) *pomonella*, L., on apple and walnut.

Marshall (G. E.) & Ford (O. W.). **The Relation of Apple Spray Schedules to the Arsenious Oxide and Lead Residues.**—*Bull. Ind. agric. Exp. Sta.* no. 381, 19 pp., 2 graphs, 5 refs. Lafayette, Ind., April 1933. [Recd. November 1933.]

Trials were made in Indiana in 1929–32 of various substitutes for lead arsenate in sprays against the second brood of the codling moth [*Cydia pomonella*, L.] on apple.

Four varieties of apple were injured by summer oil sprays, and 1 and 2 per cent. summer oil in the last three cover sprays in 1932 decreased the blossom of one variety by 66 per cent. the following year. It is doubtful whether any amount of rain would have reduced the residue from standard lead arsenate sprays to the U.S. tolerance of 0·01 gr.

arsenic trioxide per lb. of fruit. Wherever spreaders were used in the lead arsenate sprays, less residue but poorer control resulted. In the second-brood sprays, 1 per cent. summer oil, alone or in combination with oleic acid (to facilitate removal by rain of arsenical residue left by the earlier sprays) or nicotine (1 : 1,600), was not satisfactory either in control or in reducing residue, although 1 per cent. summer oil with nicotine (1 : 1,200) gave good control. The most satisfactory spray programme was lead arsenate against the first brood, and 2 per cent. summer oil with 10 per cent. oleic acid against the second. There was no fixed ratio between the weathering away of lead and arsenic trioxide residues on fruit.

NEWCOMER (E. J.). **Orchard Insects of the Pacific Northwest and their Control.**—*Circ. U.S. Dep. Agric.* no. 270, 76 pp., 83 figs. Washington, D.C., August 1933. [Recd. November 1933.]

The annual loss due to insect pests of orchards in Oregon, Washington, Idaho and Montana, including the actual loss of fruit and the cost of control measures, is estimated at about 1½ millions sterling. This circular deals with the bionomics and control of a large number of the more important of them, grouped under the fruit trees that they damage, additional sections being devoted to beneficial insects, sprays, dusts, baits, light-traps, tree bands, etc.

DAVEY (A. E.) & SMITH (R. E.). **The Epidemiology of Fig Spoilage.**—*Hilgardia* **7** no. 13 pp. 523–551, 4 figs., 14 refs. Berkeley, Calif., July 1933.

Figs in California are attacked by saprophytic micro-organisms, producing diseases commonly distinguished as " smut and mould " [*R.A.E.*, A **20** 357], " souring " [**21** 614] and " endosepsis " [**15** 595]. A study of the spoilage diseases of uncaprified [*cf.* **16** 319] second-crop Adriatic figs was carried out in 1932. The progress of infestation and the growth of the cryptogamic flora in the developing fruit were studied by observation and cultures. In other experiments, insects and micro-organisms were excluded from the inside of the figs by sealing the eyes, or the trees were completely enclosed with cheesecloth screens.

The following is taken from the authors' summary: The internal fauna of developing figs was found to consist of *Eriophyes fici*, Ewing, and various species of thrips and predacious mites, all of which were found throughout the season in immature figs with the eyes still closed, and *Carpophilus hemipterus*, L., and *Drosophila melanogaster*, Mg. (*ampelophila*, Lw.), which entered only after the eyes had opened. Ants were also found to infest ripening figs in some cases. Up to 1st July, green, nearly full-grown figs with closed eyes were found to be nearly all internally sterile ; after that date, an increasing percentage of fruit at this stage was found to contain cryptogamic micro-organisms, the earliest flora to appear being generally bacteria and certain yeast-like fungi. The fungi that cause mould (*Alternaria*, *Hormodendrum*, *Cladosporium*) were first found abundantly in fruit that reached this stage about 15th July, and no marked increase in the percentage of any stage infected was found after this date. The percentage infected with *Aspergillus niger* (fig smut fungus) was small before the opening of the eye, but then increased rapidly. The yeasts that cause souring were entirely absent until after the eyes had begun to open. No relation could be seen between the presence of *E. fici* or ants and any type of infection. *C. hemipterus* is apparently not an important factor in the transmission of smut or mould, but may be the principal carrier of the yeasts associated with souring. Predacious mites and to a much less extent thrips, which latter were not present in sufficient numbers to warrant any final conclusions, were the only living vectors to which transmission of smut and mould could be attributed.

Daniels (L. B.). **Potato Flea-beetle Control.**—*Bull. Colo. Exp. Sta.* no. 400, 34 pp., 5 figs., 16 refs. Fort Collins, Colo., May 1933. [Recd. November 1933.]

An account is given of investigations carried out in Colorado during 1929–32 on the bionomics of *Epitrix cucumeris*, Harr., and its control on potatoes. It is estimated to have caused a loss in two counties of over £87,000 (at par) in 1930 [*cf. R.A.E.*, A **17** 39]. The value of the measures tested was estimated by the fluctuations of adult population, as evidenced by sweeping at intervals throughout the summer, and by the amount of larval tunnelling in the tubers. The following is taken from the author's summary : Infestation is heaviest in moist, heavy soils. The larvae are most numerous about the third week in August and, in addition to potato, also feed on the wild ground-cherries (*Quincula lobata* and *Physalis lanceolata*) and buffalo bur (*Solanum rostratum*). Control may be obtained with a dust of calcium arsenate [*cf.* **21** 540] and hydrated lime (1 : 8) applied with a power duster at the rate of 20–30 lb. per acre 2–3 times at intervals of 10–14 days in early morning or late afternoon. The material for each treatment costs about 3*s*. per acre. Good results may also be obtained by 3 applications of a spray of 1 lb. zinc arsenite to 50 U.S. gals. water at a pressure of at least 150 lb. per sq. inch. The best equipment is a spray boom with a row of 3 nozzles, 2 being placed at an angle of 45° to cover the lower surface of the leaves and one covering the upper surface. The first spray or dust should be applied in the third week in July for potatoes planted in late May or early June.

Gnadinger (C. B.), Evans (L. E.) & Corl (C. S.). **Pyrethrum Investigations in Colorado. I. Preliminary Report on Factors affecting Pyrethrin Content.**—*Bull. Colo. Exp. Sta.* no. 401, 19 pp., 4 figs., 6 refs. Fort Collins, Colo., July 1933. [Recd. November 1933.]

The results are given of preliminary investigations in Colorado on the factors that affect the pyrethrin content of flowers of *Chrysanthemum cinerariaefolium* so as directly to influence the experimental and commercial growing of the crop. The plants used were four years old and had been grown from the same stock under identical cultural conditions. The following is substantially the authors' summary : In experiments with seven widely different methods, the method of drying did not appreciably affect the pyrethrin content. The pyrethrin content of flowers picked at the same stage of maturity from the same plant showed a seasonal variation, the causes of which have not been determined. Complete shading of the plant during the picking season greatly lowered the pyrethrin content. Ground flowers, assayed within 10 days of picking, showed no more than normal loss of pyrethrins when stored in an air-tight container at room temperature. Decomposition of pyrethrins in similar samples was entirely prevented during six months' storage by keeping the temperature at −2 to −5°C. [28·4–23°F.]. Drying the flowers with or without stalks did not influence the pyrethrin content of the flower-heads. There was a wide range in the yield of flowers and pyrethrins from individual plants. The yield of dried flowers varied from 9·24 gm. to 66·15 gm. per plant. The pyrethrins varied from 0·90 to 2·07 per cent., with an average of 1·27 per cent. for all plants studied.

GERSDORFF (W. A.). **A Comparison of the Toxicity of Nicotine and Anabasine.**—*J. Amer. chem. Soc.* **55** pp. 2941–2945, 2 diagr., 8 refs. Easton, Pa, 6th July 1933. [Recd. November 1933.]

The experiments described show that a much higher concentration of nicotine or anabasine is required to kill goldfish than of rotenone, nicotine being slightly more toxic than anabasine.

BRIERLEY (P.). **Dahlia Mosaic and its Relation to Stunt.**—*Bull. Amer. Dahl. Soc.* (9) no. 65 pp. 6–11, 19. 1933 [repr. as :] *Prof. Pap. Boyce Thomps. Inst.* **1** no. 25 pp. 240–246, 4 figs. Yonkers, N.Y., September 1933.

In the United States, the dwarfed condition of dahlias known as "stunt" is, in certain varieties, often a symptom of dahlia mosaic, a virus disease transmitted by *Myzus persicae*, Sulz. [*cf. R.A.E.*, A **21** 415]. The various symptoms and control of mosaic are discussed. Stunting, however, is commonly associated with injury to dahlias by such pests as red spider, thrips, which produce a silvered appearance on the leaves and cause them to be undersized, tarnished plant bug [*Lygus pratensis*, L.] and leafhoppers.

CARSNER (E.) & others. **Curly-top Resistance in Sugar Beets and Tests of the resistant Variety U.S. No. 1.**—*Tech. Bull. U.S. Dep. Agric.* no. 360, 68 pp., 7 figs., 14 refs. Washington, D.C., May 1933. [Recd. November 1933.]

Since attempts to control curly-top of sugar-beets by measures directed against its only known vector, *Eutettix tenella*, Baker, have not hitherto been completely successful, selective breeding experiments [*cf. R.A.E.*, A **17** 376] have been carried out in the United States since 1918, which have resulted in the production of a variety that is markedly more resistant to the disease than any of the standard commercial ones without being inferior to them in sucrose yield and purity.

CONDIT (I. J.) & HORNE (W. T.). **A Mosaic of the Fig in California.**—*Phytopathology* **23** no. 11 pp. 887–896, 4 figs., 8 refs. Lancaster, Pa, November 1933.

In a study of mosaic disease of fig in California, the possible vectors were investigated. Insect pests of foliage and branches are rare, but *Lepidosaphes ficus*, Sign., has become established in one district and is rapidly spreading, and several species of thrips are sometimes found on the young foliage. The latter do not appear to injure the leaves to any appreciable extent, though they are often responsible for fungus infection of the fruit [*R.A.E.*, A **17** 358; **22** 30]. Attack by Aphids is rare and seldom injurious. The mite, *Eriophyes fici*, Ewing, occurs on fig in all parts of California and in some localities in Oregon, the infestation being sufficiently severe in some cases to cause all leaves to fall from the tree. In the fig districts of Mississippi, Louisiana, and Texas, neither mosaic nor fig mites appear to attract attention, possibly on account of heavy pruning and the resultant vigorous, succulent growth. Investigations have not confirmed the suspicion that *E. fici* is a vector of leaf mosaic. Though spots on fig leaves may result from the localised feeding of mites on the young leaves, three fig trees examined in Oregon in 1932, had deep green foliage and were apparently entirely free from mosaic, though mites were abundant on the bud-scales and very young leaves.

Blood (H. L.), Richards (B. L.) & Wann (F. B.). **Studies of Psyllid Yellows of Tomato.** (**Abstr.**)—*Phytopathology* **23** no. 11 p. 930. Lancaster, Pa, November 1933.

Psyllid yellows of tomato [caused by *Paratrioza cockerelli*, Sulč (*R.A.E.*, A **18** 111)] is of importance only in so far as it becomes a confusing element in investigations of curly-top, the symptoms of which are similar, though distinguished by more intense yellowing and leaf-curling and more rapid death. Symptoms of yellows were not induced by inoculation with less than 30 Psyllids and were only maintained by the continued feeding of the latter, the plants recovering if the insects were removed. These results support the theory that this disease is caused by an insect toxin [*cf.* **21** 606].

Poole (R. F.). **Arsenical Injury of the Peach and some Results of Studies on its Control.**—*Proc. Amer. Soc. hort. Sci.* **29** pp. 42–44. College Park, Md, 1932. [Recd. November 1933.]

In the course of studies in North Carolina, it was observed that acid lead arsenate sometimes causes damage to peach that is liable to be confused with bacterial spot and canker. The foliage, buds and twigs of certain early varieties are injured more severely by early spray applications than later varieties, both the first two sprays frequently causing serious damage. Cankering in crotches beneath the buds results in heavy defoliation, and leaf injury, although at first confined mainly to the margins, becomes more severe as the season advances and is often most conspicuous during the late summer and early autumn. The fruits are injured chiefly on the end next the stem and on the sunny side, and later varieties are more susceptible ; the injury, which advances with maturity, causes dark spots that sometimes extend to the depth of the seeds and renders more than 50 per cent. of the fruit in many orchards worthless. The leaves, buds and twigs of trees injured by certain root diseases that stunt their growth are often less affected by lead arsenate than those of healthy trees, but the fruit is much more severely injured on diseased trees, probably owing to the absence of sufficient foliage to protect it from the light rays that combine with the arsenate to destroy the exposed tissues.

Persistent high humidity at any period during the growing season tends to increase lead arsenate injury, especially rainy weather early in the season, since defoliation exposes the fruit. Buds, fruit and twigs are often injured when rainy weather occurs 2–4 weeks before ripening, and when dry weather prevails throughout most of the spray period. For late applications in dry seasons, it would appear advisable to lower the strength of the lead arsenate by one-third or one-half. Emulsified phenol, emulsified cresol, potassium permanganate and colloidal copper sprays impregnated with lead arsenate stimulate injury. The use of potassium permanganate with lead arsenate resulted in 100 per cent. leaf and fruit injury during 1931. Coarse hydrated limes were less effective in suppressing injury than chemical lime or finishing lime, which contains some magnesium. Even after the application of 5 lb. of the better limes to 1 lb. lead arsenate in 50 U.S. gals. water, considerable injury resulted, but contrary to the tests of some investigators [*cf. R.A.E.*, A **20** 649], increasing the lime was found to reduce injury. In repeated field tests during 3 years, it was completely prevented by 50 lb. finishing hydrated lime or chemical hydrated lime in 50 U.S. gals. water. With the addition of potash fish-oil soap, this mixture is very durable, and trees sprayed with the concentrated lime held their foliage on fruit-bud wood much longer than any others. The cost involved and the amount of residue left on the fruit, however, render its use impracticable. Injury has also been reduced by the use of 3 lb. zinc sulphate in 50 U.S. gals. spray containing sulphur, lead arsenate and lime [*cf.* **20** 322, 634], no greater reduction being secured by the use of higher amounts up to 12 lb. The use of this chemical, however, seems to delay rather than prevent injury; in some tests, late injury was as severe on trees that were not sprayed with zinc sulphate as on those that were. Its use in the first two sprays after the foliage appears is nevertheless advisable where injury occurs constantly.

SMITH (F. F.). **The Nature of the Sheath Material in the Feeding Punctures produced by the Potato Leaf Hopper and the Three-cornered Alfalfa Hopper.**—*J. agric. Res.* **47** no. 7 pp. 475–485, 24 refs. Washington, D.C., 1st October 1933.

The following is taken from the author's summary and conclusions: a study was made of the chemical nature of the sheaths found in the feeding punctures made in various plants by the Jassid, *Empoasca fabae*, Harr. [*cf. R.A.E.*, A **19** 687] and the Membracid, *Stictocephala festina*, Say. Tests showed that these sheaths consist mainly of protein and may also contain chitin. They appear to be largely of insect origin and to contain no plant substance with the possible exception of pectose. The persistence of the insoluble sheaths in the vascular tissue probably interferes with the translocation of plant materials and produces the typical injuries associated with the feeding of these species.

YOUNG (P. A.) & MORRIS (H. E.). **Injury to Apple by Petroleum-oil Sprays.**—*J. agric. Res.* **47** no. 7 pp. 505–522, 2 figs., 38 refs. Washington, D.C., 1st October 1933.

In view of the injury caused to buds and leaves by some of the petroleum-oil sprays used against *Tortrix* (*Cacoecia*) *argyrospila*, Wlk. (fruit tree leaf-roller) on apple in Montana during 1921–25 [*cf. R.A.E.*, A **12** 301; **13** 625], investigations were carried out in 1926–32 in which the leaves on 2,566 branches of one variety of apple were sprayed with emulsions of 25 kinds of oils. The chief forms of injury were premature defoliation and spotting of various kinds, which are described in detail. It is concluded that the leaves should not be sprayed with an oil containing more than 15 per cent. (preferably not more than 5–10 per cent.) sulphonatable material. The various sulphonatable materials in the oils appeared to have different effects on the leaves, low concentrations of some oils being more injurious than higher concentrations of others. Their effect was aggravated by previous injury due to drought. Cresoap emulsions of 1–8 per cent. oils covered the leaves more evenly and were more easily diluted and less injurious than emulsions made with calcium caseinate. Before use in the orchard, the effect of any oil should be tested on mature apple leaves in concentrations of 16 and 100 per cent., in comparison with an unsulphonatable oil of the same viscosity ; oils that kill large parts of the leaves within a week are probably too injurious for summer sprays. Those that cause visible symptoms (other than slight angular mottling of the leaves) when applied at 1–2 per cent. concentrations are too injurious for commercial use.

In sprays applied to the buds in February–April, the oils used should contain not more than 45 per cent. sulphonatable material (preferably 30–40 per cent.)

Dutch Elm Disease Quarantine. Notice of Quarantine No. 70, with Regulations.—*U.S. Dep. Agric.* B.P.Q., Q. 70, 4 pp. Washington, D.C., 21st October 1933.

Graphium ulmi, the fungus causing Dutch elm disease, and considerable numbers of *Scolytus* spp., the known carriers of this disease in Europe, have recently been found in elm burl logs imported from Europe into the United States, where the disease has not hitherto been widely prevalent. This order prohibits, as from 21st October 1933, the importation from Europe (except under permit) of various parts and products of ulmaceous plants, comprising seeds, leaves, cuttings, etc., logs, etc., and manufactured articles. As a condition of entry, all imported elm logs must be free from bark and from wood-infesting insects and must be treated, within 20 days after arrival and before the removal of any waste or trimming, with hot water or steam so as to subject every part of each log to a temperature of not less than 180°F. for at least 2 hours, or by other approved treatment.

Phillips (W. J.) & Barber (G. W.). **Egg-laying Habits and Fate of Eggs of the Corn Ear Worm Moth and Factors affecting them.**—*Tech. Bull. Va agric. Exp. Sta.* no. 47, 14 pp., 1 graph, 3 refs. Blacksburg, Va, March 1933. [Recd. December 1933.]

This paper presents the results of observations carried out in Virginia during the years 1921–22 and 1924–27.

The following is largely taken from the authors' summary : *Heliothis obsoleta*, F., deposits its eggs on maize almost continuously from the end of May to October, but the number laid on any particular plant depends on the date of planting and the seasonal abundance of the moths [*cf.* *R.A.E.*, A **8** 314]. The females oviposit most readily on the moist silks [*cf.* **20** 523] on the third day after they are formed. Early in the season, before silks appear, eggs are laid on all parts of the plants, and even after the appearance of the silks other parts receive a few eggs. Most eggs were generally laid on late-planted maize, which silked when second-brood emergence was at its maximum, a less number on early-planted maize, the silks of which were exposed to the first brood, and fewest on that planted in mid-season. Only a small percentage of the eggs hatch. Large numbers of those on silks, stalks, husks and tassels, and relatively few on the leaves are destroyed by the predacious Anthocorid, *Orius* (*Triphleps*) *insidiosus*, Say [*cf.* **20** 177], the importance of which increases as the season advances. *Trichogramma* *minutum*, Riley, parasitises more eggs on the upper surface of the leaves than on any other part of the plant, being most effective in the middle of June and becoming less so later. Eggs are dislodged most often from the leaves and silks, where they are most exposed to wind and rain, and especially from the lower leaf surfaces, which are very smooth. The percentage of eggs that hatched decreased as the season advanced, owing to the increase in the numbers of enemies.

BRITTAIN (W. H.). **Apple Pollination Studies in the Annapolis Valley, N.S., Canada 1928–1932.**—*Bull. Dep. Agric. Canada* no. 162, 198 pp., 1 pl., 73 figs., 4 pp. refs. Ottawa, May 1933. [Recd. November 1933.]

The first paper of this series discusses the apple industry in Nova Scotia and the factors other than pollination that affect the setting of fruit, injuries caused by insects [*cf. R.A.E.*, A **18** 117 ; **20** 228] being briefly noticed in the section dealing with pathological factors ; the second discusses the processes of pollination and fertilisation, the causes of unfruitfulness, and the percentage of flowers required to give an economic yield ; and the third, by W. H. Brittain and D. S. Blair, describes experimental studies in apple pollination.

The fourth paper deals with field studies of the part played by insects in apple pollination, which showed that, owing to the use of poisoned sprays and dusts [*cf.* **21** 462], *Apis mellifera*, L. (*mellifica*, L.) had ceased to be a factor in apple pollination in the Annapolis Valley. Dusting is usually more fatal than spraying, but severe losses may follow either practice when insecticides are applied to the blossom of apple or other plants growing in or near the orchard. Pollination was mainly effected by various species of *Halictus* and *Andrena*, which nest in the ground in the neighbourhood of orchards. These solitary bees, a list of which is given, were reasonably plentiful in most orchards during 1928–31, but in 1932 they were apparently scarcer, and this, combined with unfavourable weather for bee activity during the blossoming period, had a noticeable effect on fruit setting. Bumble bees, *Bombus* (*Bremus*) spp., were sometimes abundant locally, but were of minor importance in most orchards. Although under favourable conditions solitary bees alone may be able satisfactorily to pollinate the apple crop, it is often desirable to supplement their efforts by supplying hive bees. In orchards surrounded by large areas devoid of bees, a concentration of 35–50 colonies may be necessary to ensure pollination, whereas in districts where bee-keeping is general and neighbouring orchards are similarly supplied, one colony to the acre or even to 4 acres may be sufficient. Without the proper distribution of cross-fruitful varieties however, placing bees in an orchard only results in unfruitful self-pollinating or crossing.

In the fifth paper, F. A. Herman and W. H. Brittain report studies showing that the use of larger spray outfits and a different type of nozzle, causing greater drift of the spray to surrounding vegetation, has increased the amount of bee-poisoning. This seems to be due mainly to arsenic (in the form of lead or calcium arsenate), but sometimes to sulphur dust alone. Clear evidence of repulsion from copper sulphate, lime-sulphur and nicotine has been obtained experimentally, but under orchard conditions it appears to be temporary and does not prevent serious loss. Arsenical poisoning results in dysentery and paralysis, and the death of the bees, soon followed by that of the larvae and pupae. Symptoms of sulphur poisoning are similar but less severe. No clear cases of poisoning by copper fungicides or nicotine were obtained under field conditions. Poisoning will probably follow when the arsenic in a bee is more than 0·00004 mg., and certainly when it is over 0·00008 mg.

Field observations supplemented by chemical analyses of numerous samples led to the following conclusions: All sprays containing arsenicals are dangerous when applied during bloom; only sprays or dusts containing arsenicals result in dead brood; the combination causing the highest mortality was sulphur-lead arsenate in dust form; less mortality resulted from sprays and dusts containing copper sulphate or nicotine in addition to the arsenical; sulphur dust free from poison may cause the death of bees, though it has not yet been determined to what extent it does so under field conditions; although the greatest mortality is caused just before and just after the main blossoming period, no time between May and August is entirely safe, sprays applied against *Rhagoletis pomonella*, Walsh, sometimes causing severe poisoning in August. Severe poisoning has been observed even when the prevailing conditions have been cool and wet, and some of the worst cases have been noted during brief intervals of fine weather, whereas attempts to induce poisoning by placing hives in a sprayed or dusted orchard when the weather favoured flight sometimes resulted in failure. This is probably because bees after several days' confinement seek moisture from leaves of treated trees and poisoned vegetation growing beneath them, besides bringing in much poisoned pollen, whereas during periods of weather favourable to flight the poisoned pollen collected may not be consumed but stored.

The main source of poisoning both of bees and brood is pollen, but water dropping from sprayed leaves or vegetation growing in the orchard may be a very important factor. Only minute quantities of poison have been found in nectar, but even this may be deadly to very young larvae. Severe cases of poisoning before and during the blossoming period are sometimes attributable to poison obtained from dandelion flowers in or near the orchard, and later cases were mainly traceable to wild radish, although many other plants may serve as sources. Large colonies and apiaries exhibit the most severe cases. Poisoning was reduced to a minimum, although not eliminated, where bees were placed in the orchards after the application of the pink-flower spray when the early varieties were in bloom and taken away before the application of the calyx spray. It is impossible to maintain apiaries anywhere in the fruit belt at any time between May and August without incurring risk of loss. Considerable amounts of arsenic, enough to destroy the larvae of hive bees, were found in samples of pollen taken from the nests of solitary bees, but evidence of the depletion of these by poisoning is difficult to obtain and has not yet been secured.

SAALAS (U.). **Viljelyskasvien tuho- ja hyötyhyönteiset.** [Insects and other Invertebrates injurious and beneficial to Agricultural Plants.]—*Vanamon Kirjoja* no. 30, Roy. 8vo, viii+676 pp. 602 figs., 11 pp. refs. Helsingfors, Werner Söderström Osakeyhtiö, 1933. Price 250 Finnish Marks.

The first third of this work includes sections devoted to a general account of the anatomy, classification and biology of insects, mites, etc.;

the nature of the damage they do ; their natural enemies, diseases and biological control ; and the equipment and insecticides used against them in various parts of the world. In the remainder, more or less detailed notes are given of the bionomics of the principal insects, etc., occurring in Finland, arranged in systematic order, with brief descriptions of the various species. Lists of the crops with the pests that attack them and a subject index are appended.

JANCKE (O.). **Weiterer Beitrag zur Bekämpfung der Kirschblütenmotte** (*Argyresthia ephippiella*). [A further Contribution to the Control of the Cherry-blossom Moth.]—*Gartenbauwiss.* **3** no. 4 pp. 384–390, 1 fig. Berlin, 1930.

JANCKE (O.). **Die Kirschblütenmotte** (*Argyresthia pruniella* **L.**) **und ihr Parasit** (*Ageniaspis atricollis* **Dalm. Hym.**).—*Op. cit.* **6** no. 3 pp. 303–386, 64 figs., 50 refs. Berlin, 1932. [Recd. November 1933.]

The first paper deals with experiments made in 1929 at Naumburg a. Saale (Saxony) against *Argyresthia ephippiella*, F., of which the author in the second paper, agreeing with Lundblad [*R.A.E.*, A **12** 108], considers *A. pruniella*, L., to be an earlier name. Tar distillates proved effective as winter sprays, especially Dendrin, one application of which at 10 per cent. strength reduced infestation by 94·8 per cent. In the laboratory, the adult moths were poisoned by 2 per cent. sugar solutions containing sodium fluoride or sodium fluosilicate, both at strengths of 4 and 6 per cent., or 2 per cent. barium chloride. In the field, a bait spray containing 2 per cent. sugar and 1 per cent. sodium arsenite or 2 per cent. barium chloride killed a large percentage of the adults on cherry trees, but the sodium arsenite (which was the more effective) caused scorching. Trap-glasses containing liquid baits proved ineffective.

The second paper is a report on studies at Naumburg since 1924 and includes a detailed description of the morphology of all stages. The food-plants recorded in the literature were investigated, but except for *Sorbus terminalis*, which the author was unable to examine properly, only *Prunus* spp. were attacked. The degrees of infestation found in 17 species and varieties of *Prunus* are recorded. Cherries were much more severely attacked than plums, and sweet cherries generally more so than sour.

The flight-period began about mid-June and ended in September or late August [*cf.* **18** 180]. The moths appeared earlier after a wet May or in a warm June. The early pupal stage seemed very sensitive to dryness, and in the laboratory few adults developed from larvae that had entered dry earth to pupate. The adults were estimated to live about a month and appeared to feed on exudations from the leaf-stalks. The eggs were laid in summer in the thick crown of the tree behind bark-scales and, less often, bud-scales. On an average, one female laid 24–28. After the cold winter of 1928–29, the first larvae hatched on 22nd April, but they appeared 3 weeks earlier in the spring of 1930. The larval period averaged about 5 weeks, and the pupal about a month. The young larvae fed chiefly on the stamens, and older ones on the ovaries and pistils. One larva usually destroyed 5–7 flowers, 3–4 of them during the last third of its life. Unfertilised flowers were almost always less infested. The amount of infestation of cherry trees did not seem to be influenced by the nature of their surroundings.

Various suggested control measures are reviewed, and the author's own experiments are described, including those noticed above. The effect of arsenical sprays or dusts against the young larvae depended on their date of hatching, and owing to the resultant difficulties the greatest reduction of infestation thus achieved was 68 per cent.

An account is given of the bionomics of the Encyrtid parasite, *Ageniaspis atricollis*, Dalm. [*cf.* **15** 557], with notes on its morphology. The eggs, which were polyembryonic, were laid in those of the moth. About a week after the host larva had spun its cocoon in the ground, it was entirely devoured by the parasites, which then prepared pupal chambers within its skin in which they pupated after 10–12 days, the pupal stage lasting about 14 days. Adult emergence continued for 10 days in the laboratory, and captive adults lived for nearly 3 weeks, feeding on drops of sugar solution. On an average, each host larva produced 11 parasites. In 1928, the first parasites appeared 6 days after the adults of the moth, the actual flight-period beginning about 2½ weeks after and ceasing 2½ weeks before that of the latter. In the first 3 weeks the males predominated, but over the whole flight-period there was an excess of 14 per cent. females. In 1929, only 14 per cent. of 230 larvae were parasitised.

FLETCHER (T. B.). **An Australian Tortricid** (*Tortrix postvittana*, **Walker) in England.**—*Ent. Rec.* **45** no. 12 pp. 165–166. London, December 1933.

Tortrix postvittana, Wlk., was reared on 1st June 1933 from a larva found on 23rd May in an apple imported from New Zealand. This Tortricid, which is a well known apple pest in Australia and Tasmania, was introduced about 40 years ago into New Zealand and is also known from New Caledonia and Hawaii. It feeds on various plants and could probably become acclimatised in southern England.

MOSS (J. E.). **The Natural Control of the Cabbage Caterpillars,** *Pieris* **spp.**—*J. Anim. Ecol.* **2** no. 2 pp. 210–231, 2 figs., 20 refs. London, November 1933.

An account is given of the collection in England of parasites of *Pieris rapae*, L., and *P. brassicae*, L., and their shipment to New Zealand for the control of *P. rapae* [*cf.* next abstract and *R.A.E.*, A **21** 13], together with observations on their biology and interrelation made at the Parasite Laboratory of the Imperial Institute of Entomology.

There is no evidence of polyembryony in the development of *Apanteles glomeratus*, L., in the larvae of Pierids, but as many as a hundred larvae may develop in a single host, the average being 44·7 in *P. brassicae* and 30 in *P. rapae*. The presence of the parasites does not prevent the host larva from preparing for metamorphosis, but practically no fatty reserves are found in the adipose tissue of heavily parasitised caterpillars. The parasite larvae leave the host almost invariably after it has spun its pupal mat, so that, as the size of the colony varies, emergence seems to be determined by the behaviour of the host and not by the physiological conditions of the parasite. It is apparently also related to daily temperature. Larvae that left their hosts in September developed to the adult stage without hibernating when kept indoors. Those exposed to 32°F. from 5 minutes after emergence spun their cocoons and hibernated successfully. Cocoons containing pupae kept at 32°F. for several weeks produced adults normally when transferred to higher temperatures. Larvae soaked by heavy rain while spinning their cocoons in the field remained quiescent until the excess moisture had evaporated, and then completed their cocoons with no more than normal mortality. In 1,284 cocoons collected in February 1933 and placed in incubators, there was a mortality of 9·81 per cent. (mostly of larvae) ; 46·26 per cent. produced adults, and the following hyperparasites emerged : *Hemiteles fulvipes*, Grav., from 37·69 per cent., *H. areator*, Panz., from 0·93 per cent., *Mesochorus pectoralis*, Ratz., from 0·47 per cent., and *Dibrachys cavus*, Wlk. (*boucheanus*, Ratz.) from 4·83 per cent. *H. submarginatus*, Bridgm., and *Tetrastichus rapo*, Wlk., were bred from *A. glomeratus* in preliminary experiments.

The solitary parasite, *A. rubecula*, Marsh., was frequently reared from *P. rapae* but never from *P. brassicae.*

The Tachinid, *Phryxe vulgaris*, Fall., occurred fairly frequently in Pierids collected at Burnham, Buckinghamshire. It is viviparous and probably deposits larvae in the young host caterpillars. The larvae, which do not enter their active feeding period until their hosts have pupated, leave the parasitised chrysalids at about the same time as the normal host adults emerge.

Of 203 pupae of *Pieris* exposed to *Pteromalus puparum*, L., and then kept at about 80°F., 55 produced adults of *P. puparum*, 5 produced *Pieris* adults, 50 died of bacterial or fungus disease, and 13 produced *Phryxe vulgaris* ; in 49 the larvae of *P. puparum* entered a diapause, and 31 were unparasitised and hibernated.

Chrysalids of both *P. rapae* and *P. brassicae* parasitised by this Pteromalid were sent to New Zealand, as well as cocoons of *Apanteles glomeratus.*

If *A. glomeratus* and *A. rubecula* occur together, the latter probably survives, because it emerges when the host is only half-grown. *P. vulgaris* has been found in the host larvae with *A. glomeratus*, but must inevitably die after the emergence of the latter.

Other factors in the natural control of *Pieris* are discussed. In early August 1931, only a few larvae of *P. rapae* and none of *P. brassicae* were found in the field in the Burnham district. The former gradually increased after this date, but the latter was not abundant until the first week in September. Large open fields of cabbage were less infested than small allotments, and kitchen gardens were often heavily damaged, apparently owing to the presence of suitable places for hibernation, such as sheds and fences. Rain may exert a controlling influence in the first and second instars, when the larvae often drown in water accumulated on the leaves or at the leaf bases, or fall to the ground because they can only cling with difficulty to the wet leaf surface. Bacterial diseases also reduce the numbers of the larvae. Parasitism by *A. glomeratus* and by *A. rubecula* is to some extent complementary, the former acting earlier in the season. The effective parasitism of pupae by *Phryxe* was only 6 per cent., and that by *Pteromalus* was inversely proportional to that by *A. glomeratus.* Large numbers of pupae were destroyed by birds, and when they were suspended in slings, in positions in the field similar to those in which pupae had been found, only 17 per cent. survived.

The relation of pupal coloration to birds is discussed in detail. The author considers that the protective value of coloration in relation to natural enemies is practically negligible.

MUGGERIDGE (J.). **The White Butterfly** (*Pieris rapae*) **and its Parasites. A Record of recent Control Work.**—*N. Z. J. Agric.* **47** no. 3 pp. 135–142, 5 figs., 3 refs. Wellington [N. Z.], 20th September 1933.

Pieris rapae, L., was increasingly destructive to crucifers in New Zealand during 1932–33, occurring over North Island as far north as Auckland and in three localities in South Island [*cf. R.A.E.*, A **21** 13]. Notes are given on its bionomics.

Apanteles glomeratus, L., had been reared in small numbers in New Zealand during the preceding winter [*cf. loc. cit.*], and further consignments of this parasite and of *Pteromalus puparum*, L., sent from England by the Imperial Institute of Entomology [see preceding abstract], were received and liberated during the summer in one area in North Island. From the 100,000 pupae of *Apanteles* received, 43,330 adults emerged, of which 37,682 were despatched for release at the rate of about 100 to a test tube (6 in. by 1 in.), in which pairing readily took place. Dissection of larvae taken in the field showed a small percentage of parasitism. The hyperparasites, *Mesochorus pectoralis*, Ratz., and *Tetrastichus rapo*, Wlk., were responsible for some mortality among the original consignments. *P. puparum* is polyxenous. One female laid a maximum of 399 eggs [**20**, 88], and attacked a maximum of 18 host pupae, an average of 20 adult parasites emerging from each. Adult life ranged from 1 week to 3 months, and some of the larvae underwent a diapause of several months. The minimum period from egg to adult was 21–25 days. Of 12,386 adults emerging from two consignments, 10,812 were liberated in the same area as *Apanteles*. Random collection of 415 pupae revealed 58 per cent. parasitism, indicating the completion of at least one generation and the general distribution of the parasites among the infested crops.

Other natural enemies of *P. rapae* encountered during surveys were : the Pentatomid, *Oechalia consocialis*, Boisd., and larvae of *Heliothis obsoleta*, F., both of which attack the larvae and pupae but are not considered of importance in control ; one disease of the larvae and pupae and another of the latter only ; and starlings, large numbers of which practically eradicated a heavy local infestation.

CUNNINGHAM (G. H.). **Orchard Sprays in New Zealand. VI. The Nicotine Series.**—*N. Z. J. Agric.* **47** no. 3 pp. 154–160, 20 refs. Wellington [N.Z.], 20th September 1933.

In this paper, which is one of a series [*cf. R.A.E.*, A **21** 645], the properties and insecticidal value of nicotine and its compounds are reviewed from the literature. Notes are included on the application of nicotine and nicotine sulphate as fumigants, sprays or dusts, which last are not recommended under New Zealand conditions, and on the preparation of home-made sprays from tobacco leaf.

MUGGERIDGE (J.). **Some recently recorded exotic Insect Pests.**—*N. Z. J. Agric.* **47** no. 4 pp. 221–228, 5 figs., 7 refs. Wellington [N.Z.], 20th October 1933.

Notes from the literature are given on the bionomics and control of four insect pests recently introduced into New Zealand, together with brief descriptions. *Listroderes costirostris*, Schönh. (*obliquus*, Gyll.) [*cf. R.A.E.*, A **21** 24, 168, etc.] has probably been established for some time, for during the last 2 years it has been recorded from widely separated localities. This weevil stunts the growth of numerous vegetables by destroying the tender young crown leaves, carrots and turnips being preferred by the larvae, which are active during the autumn, winter and spring, and young tomato and potato plants by the adults, which begin to emerge during September–October and aestivate in the hotter months of summer and early autumn. *Psila rosae*, F. [*cf.* **17** 452 ; **18** 430] was reared from carrots received from Auckland in August 1931. If it becomes prevalent in New Zealand, it will probably have two generations and a partial third in the north and two in the south. Sowing after the main emergence of the first brood is probably the only control measure applicable over large areas. *Ceroplastes rusci*, L. [*cf.* **15** 237] and *C. rubens*, Mask., were first recorded from New Zealand in July 1932, on *Citrus* in Auckland. The latter species has a very wide range of food-plants in other countries. Two applications of a 2 per cent. summer oil spray in spring or summer against the migrating scales would probably give adequate control [*cf.* **20** 274].

MUGGERIDGE (J.). **Entomology Section.**—*Rep. Dep. Agric. N. Z. 1932–33* pp. 47–49. Wellington [N.Z.], 1933.

A survey of the thrips infesting orchards in New Zealand revealed the presence of *Isoneurothrips* sp., *I. australis*, Bagn., and *Taeniothrips vulgatissimus*, Hal., which have not previously been found there. *Haplothrips niger*, Osborn, not previously recorded from the southern hemisphere, is now well distributed in New Zealand on clover (*Trifolium pratense*) and may cause serious losses in seed production.

In further laboratory investigations on *Eucolaspis brunnea*, F., on apple [*cf. R.A.E.*, A **21** 67], a spray of 2 lb. lead arsenate in 100 gals. water did not act as a repellent. Fruits were protected by a complete coating of lead arsenate or oil, or both combined. The overwintering eggs of *Paratetranychus pilosus*, C. & F. [*cf.* **21** 66] were laid on fruit trees as early as the end of January, the oviposition period continuing to mid-April ; these eggs hatch from mid-September to early in November. The number laid by one female varies from 15 to 30. Tests showed that 90 per cent. control may be obtained with a dormant spray of 10 per cent. oil. The only important natural enemy of the mite was a Coccinellid, *Scymnus* sp., other predators observed being a midge larva and two species of mites.

In further studies of *Odontria zealandica*, White [*cf.* **21** 481], experiments in spraying trap crops of orach [*Atriplex*], which were very attractive to the adults, with lead arsenate were inconclusive. Successful results in control of the larvae were obtained by scattering lead arsenate powder on turf at the rate of 5 lb. to 1,000 sq. ft. [*cf.* **20** 557].

An account is given of work on the biological control of *Pieris rapae*, L. [**22** 40]. Much of the injury caused to crucifers by *Plutella maculipennis*, Curt., which was extremely abundant, was erroneously attributed to this Pierid [*cf.* **21** 66].

FRENCH (C.). **New Records of Plants attacked by Native Insects.**—*Vict. Nat.* **50** no. 6 p. 147. Melbourne, October 1933.

This paper, which is one of a series [*cf. R.A.E.*, A **21** 679], deals with the Tineid, *Cryptophasa* (*Maroga*) *unipunctata*, Don. Its natural food-plants in Victoria are *Acacia, Banksia, Casuarina,* etc., but it is now a pest of cherry, quince, apricot, peach, plum, pear and apple. It also attacks loganberries and raspberries and causes damage to various shade trees [**5** 435]. As many as 40 eggs may be laid by one female on the bark of a tree, and as soon as they hatch the larvae begin to feed on the bark close to the surface, covering themselves as they tunnel with a mass of silk and sawdust material. After some time, they bore to the centre of the branches and by burrowing there may cause the death of the tree. In their native food-plants they usually make galleries in the forks between branches, but in fruit trees any part may be attacked. They pupate in the galleries close to the surface. The moths usually emerge at night and hide by day under loose bark on the tree.

HELY (P. C.). **Control of the Green Peach Aphid on the Murrumbidgee Irrigation Area.**—*Agric. Gaz. N.S.W.* **44** pt. 10 pp. 751–758, 2 figs., 1 ref. Sydney, October 1933.

Myzus persicae, Sulz. (green peach aphis) [*cf. R.A.E.*, A **16** 362] is distributed throughout the peach and nectarine areas in New South Wales and may cause considerable damage, particularly in part of the Murrumbidgee Valley, where most of the peaches used for canning are produced. In experiments in this area in 1931 and 1932, tar distillate washes at concentrations as low as 1 : 80 applied on 21st July gave fairly good control of the overwintering eggs, and one of 1 : 40 was effectively and safely used at a reasonable cost [*cf.* **21** 480]. They are also of value against black peach aphis [*Anuraphis persicae-niger*, Smith] and at a strength of 1 : 40 gave decided control of the peach leaf-curl fungus. Against the Aphids that had hatched from the overwintered eggs, nicotine sulphate (1 : 600), combined with lime-sulphur (1 : 8) as a fungicide, gave complete control at the early pink-flower stage (about the second week in August) in warm weather. Pyrethrum extract (1 oz. to 16 gals.) with lime-sulphur was not quite so effective. Besides being itself slightly toxic to the Aphids, the lime-sulphur probably serves as an activator for both nicotine sulphate and pyrethrum, neither of which was so satisfactory when combined with soap or oils. In cold, windy weather, practically no control was obtained with nicotine sulphate and very little with pyrethrum extract. Red and white oils (1 : 30) were fairly satisfactory, but would not be of value where the Aphids were very numerous ; the fungicide must be applied separately, unless a white oil compatible with lime-sulphur is used. Dusting with pyrethrum was not satisfactory, and this method of application is not advisable with the apparatus generally available or under the conditions usually existing during August in this area. No appreciable re-infestation took place on sprayed trees, though *M. persicae* and leaf-curl were present on all untreated ones.

TAKAGI (G.). **New Forest Pest in Korea.** [*In Japanese.*]—*Chosen Sanrinkwaihô* no. 94 pp. 42–49. 1932. (Abstr. in *Jap. J. Zool.* **5** no. 2 p. (6). Tokyo, 20th October 1933.)

An account is given of the distribution, morphology, life-history and natural enemies of *Coleophora laricella*, Hb., which attacks larch (*Larix dahurica* var. *coreana* and *L. kaempferi*) in Korea. The injury it causes and the control measures adopted are discussed.

TAKAGI (G.). **Notes on Cherry Tree Pest** (*Elcysma westwoodi* **Vollenhoven) in Korea.** [*In Japanese.*]—*Chosen Sanrinkwaihô* no. 92 p. 17. 1932. (Abstr. in *Jap. J. Zool.* **5** no. 2 p. (6). Tokyo, 20th October 1933.)

Notes are given on the life-history, distribution and food-plants of the Zygaenid, *Elcysma westwoodi*, Sn., in Korea, together with measures for its control on cherry.

The Red Weevil of Coconuts.—*Trop. Agriculturist* **81** no. 4 pp. 261–265. Peradeniya, October 1933.

This is a revision of a previous paper on the bionomics of *Rhynchophorus ferrugineus*, F., on coconut in Ceylon [*R.A.E.*, A **11** 55], with brief notes on its control. Recent experiments have shown that oviposition begins 3–5 days after emergence, and eggs are laid daily for about 3–8 weeks. In records of 12 females, the number of eggs laid varied from 50 to 302. The pupal stage lasted 12–25 days in the laboratory.

MARSHALL (Sir G. A. K.). **On new Indian Curculionidae (Col.).**—*Ann. Mag. nat. Hist.* (10) **12** no. 72 pp. 565–583. London, December 1933.

The new weevils described include *Pagiophloeus umbricidus*, which killed large numbers of shade trees (*Grevillea*) in a tea plantation in Mysore; *Diplophyes* (gen. n.) *shoreae*, bred from seeds of *Shorea robusta* in Assam; *Camptorrhinus albizziae* on *Albizzia* and *S. robusta* in the United Provinces and *Albizzia* in Assam; and *Mecistocerus ricini* on castor (*Ricinus communis*) in the United Provinces.

MAYNE (W. W.), NARASIMHAN (M. J.) & SREENIVASAN (K. H.). **Spraying of Coffee in South India.**—*Bull. Mysore Coffee Exp. Sta.* no. 9, 69 pp., 8 pls., 38 refs. Bangalore, 1933.

In the course of this bulletin, the effect on the Scolytid, *Xylotrechus quadripes*, Chevr., and on Coccids, particularly *Coccus viridis*, Green, of the application of fungicides against the major diseases of coffee is discussed (pp. 13–15). *X. quadripes* is the most important pest of this crop in Mysore and is extremely difficult to control. Conditions of heavy shade are unfavourable to the ovipositing females. The foliage of bushes sprayed with Bordeaux or Burgundy mixture against the leaf disease, *Hemileia vastatrix*, was about twice as dense as that of untreated ones at the end of September, so that the main stems received more shade during October, when oviposition and also infestation by the fungus are often at a maximum. The number of bushes that had to be removed from the field on account of borer attack was thus reduced, the average percentages in two seasons being 12·3 in unsprayed plots and 2·2 and 3·6 in those sprayed with Bordeaux and Burgundy mixture, respectively. The considerable increase of Coccids frequently reported to be due to spraying may be a result of the destruction of *Empusa lecanii* and *Cephalosporium lecanii*. Inquiries by Windle in 1932 suggest that scales are as numerous on unsprayed bushes as on sprayed ones, and *C. lecanii* has recently been found infesting *Coccus viridis* on thoroughly sprayed plants. The effect of destroying entomogenous fungi present at the time of treatment should only be temporary, provided that sources of infection exist for those scales that hatch after the application of the fungicide. In the absence of alternative food-plants infested with infected scales, a few coffee plants might be left unsprayed.

MAYNE (W. W.) & SUBRAMHANYAM (V. K.). **Nematode Worms in Relation to the Cockchafer and Mealy Bug Problem in Coorg.**—*Bull. Mysore Coffee Exp. Sta.* no. 11, 34 pp., 3 pls., 16 refs. Bangalore, 1933.

The unhealthy condition and heavy mortality of young coffee plants in certain areas in Coorg have hitherto been attributed exclusively to injury to the roots by Lamellicorn larvae and a mealybug [*R.A.E.*, A **21** 209]. The leaves of affected plants turn yellow, their development and that of the shoots is stunted and the root system is abnormal ; in dry weather, many wilt and die, and fall over at the slightest touch.

During the monsoon period in July 1931 and again in 1932, numbers of Lamellicorn larvae of various instars and possibly different species were found in the soil of affected areas. They mainly occurred, however, in the top 6 inches, which are above the level of the greatest development of the coffee roots, and were not actually attacking the latter or concentrated round them. They were always much less numerous under old, thick coffee trees than in open areas of young plants. In dry weather, they descended deeper into the soil. During the dry period in February–March 1932, remarkably few larvae were found, though pits were dug to a depth of more than 6 feet ; thorough watering of some of the pits did not bring up any larvae from the still deeper layers. At the same time, the coffee plants showed fresh signs of injury, and there seemed to be no correlation between the numbers of larvae in the soil and of deaths of young coffee plants. In laboratory experiments in which a number of larvae were placed in pots and in a large box with coffee plants planted in various soils, they never attacked the roots, and those put in pots containing sand died, apparently from starvation. The adults were active during March and April. It was found that they could be caught with a net and torch in the evening, whereas light-traps were ineffective.

The mealybug found on the tap and lateral roots of coffee was *Pseudococcus citri*, Risso, and that on the shade tree, *Erythrina lithosperma* [*cf. loc. cit.*], was *P. debregeasiae*, Green ; all attempts to establish the latter on coffee or the former on *Erythrina* have failed. In field observations and experiments with coffee plants in pots, severely infested plants often showed no noticeable deterioration, and it is thought that the mealybugs cause only minor injury that is probably never fatal.

Evidence is given that the Nematode, *Anguillulina* (*Tylenchus*) *coffeae*, Zimm., which is very injurious to coffee in parts of Java, is a much more serious pest than the other two and is probably responsible for most of the damage caused.

RAMAKRISHNA AYYAR (T. V.). **Sugarcane Insects and Problems connected with them in South India.**—*Madras agric. J.* **21** no. 10 pp. 421–430, 1 pl. Coimbatore, October 1933.

Notes are given on the chief sugar-cane pests of southern India and their control [*R.A.E.*, A **21** 673]. *Sesamia inferens*, Wlk., a pest of ragi [*Eleusine coracana*] and maize, occasionally breeds in sugar-cane. *Termes* (*Odontotermes*) *obesus*, Ramb., hollows out the underground parts and destroys the buds, and *Coptotermes* (*Eutermes*) *heimi*, Wasm., feeds on the leaves of young seedlings. Among the minor pests are:—the Coccids, *Ripersia sacchari*, Green, and occasionally *Aclerda japonica*, Newst.; the Aleurodid, *Neomaskellia bergi*, Sign.; the Hesperiid, *Telicota augias*, L.; the Hispid, *Phidodonta modesta*, Wse.; *Bregmatothrips ramakrishnae*, Bagn.; the root Aphid, *Tetraneura ulmifoliae*, Baker (*ulmi*, DeG.); and *Hieroglyphus banian*, F., which may damage cane growing near rice, of which it is a serious pest [**21** 675; etc.].

SUREYA (M.). **Turkey: Plant Enemies observed in Anatolia during 1933.**—*Int. Bull. Pl. Prot.* **7** no. 11 pp. M 247–248. Rome, November 1933.

Dociostaurus maroccanus, Thnbg., appeared in Anatolia as usual in 1933, but a high mortality resulted from excessive drought during the period of greatest activity. Oviposition occurred only over a certain area of the desert steppe [*cf. R.A.E.*, A **21** 627]. The solitary phase of *Locusta migratoria*, L., was injurious in one region and that of *Calliptamus italicus*, L., occurred in another, where control measures proved unnecessary. Damage to hazel by *Curculio* (*Balaninus*) *nucum*, L. [*cf.* **19** 250] was insignificant; considerable loss is caused annually, however, by *Eriophyes avellanae*, Nal., which was effectively controlled for the first time by the collection and burning of infested buds. A total of 80 per cent. of the crop of apples for export was saved from *Cydia* (*Carpocapsa*) *pomonella*, L., which causes severe damage, by two applications of lead arsenate. *Hyponomeuta padellus malinellus*, Zell., was widely distributed and very injurious to apple and apricot. *Dacus oleae*, Gmel., was present in all olive plantations. *Chrysomphalus dictyospermi*, Morg., was injurious to oranges in a district in the south-east, where three generations were observed. It has been found impossible to eradicate *Aulacaspis* (*Diaspis*) *pentagona*, Targ., by removing mulberry trees, as this Coccid also attacks other trees, including walnut and peach, some of which were seriously damaged during the year. Numbers of mulberry trees were killed by it.

UVAROV (B. P.). **The Locust Outbreak in Africa and Western Asia in 1932.**—*Econ. Adv. Coun. Comm. Locust Contr.* 74 pp., 11 maps, 12 pp. refs. London, H.M.S.O., 63–80–2, 1933. Price 3*s*.

In continuation of the survey for 1925–31 [*R.A.E.*, A **21** 401], the breeding and migrations in 1932 of *Schistocerca gregaria*, Forsk., *Locusta migratoria migratorioides*, R. & F., and *Nomadacris septemfasciata*, Serv., are discussed in detail and illustrated by a series of maps.

The data on *S. gregaria* show that there are several more or less independent areas in its distribution, *viz.* the Moroccan-Senegambian, the Algerian-Nigerian, the Sudanese-Arabian, the Somali, and the Indo-Persian. The swarms bred in Morocco in spring migrate southwards until they encounter the zone of summer rains in Mauretania and Senegal. Here they breed, and the resulting adults migrate northwards, reaching the Mediterranean countries early in the following year. A similar relation exists between the spring-bred swarms in Algeria and those produced in the summer-rain belt south of the Hoggar mountains. In the Sudanese-Arabian area, one generation breeds in the interior of the Anglo-Egyptian Sudan during the summer rains and its progeny migrates partly to the Red Sea coast, where owing to local climatic conditions breeding may occur in winter, and partly to Arabia, where the rains are erratic and breeding may take place at any time between December and April, the ensuing swarms spreading to Transjordan, Palestine, Egypt and the Anglo-Egyptian Sudan. In 1932, the invasion was still serious in the western areas, but the situation has greatly improved in eastern Africa and in Asia.

The discussion of *L. m. migratorioides* in Africa is accompanied by a scheme of generations as observed in 1932 in some areas. The most outstanding event was the tendency of the swarms bred south of the equator to migrate in a south-westerly direction, which carried them for nearly 30° southwards and 15° westwards but did not result in an appreciable extension of the breeding area owing to the absence of suitable conditions. The further outlook with regard to this species is considered to be definitely hopeful.

The history of the present outbreak of *N. septemfasciata*, swarms of which appeared in the neighbourhood of the Mweru Marshes, Northern Rhodesia, in 1927, shows that there is a regular seasonal migration. A remarkable increase has occurred in the number of swarms, and a continued extension of the area of infestation is expected. The danger to the Union of South Africa from swarms originating to the north of it is stressed, and it is suggested that the former invasions by this locust also originated outside the Union.

Appendices contain a note on the occurrence of *Patanga succincta*, L. (Bombay locust) in the Unfederated Malay States, and a list of papers on the locust and grasshopper problem, supplementing that published with the previous survey.

WATERS (H. B.). **Experimental Work.**—*Rep. Dep. Agric. Gold Cst 1932–33* pp. 12–16. Accra, 1933.

This section includes brief notes on insect pests in the Gold Coast during 1932–33. In experiments against *Achaea lienardi*, Boisd., and other fruit-piercing moths attacking *Citrus* [*cf. R.A.E.*, A **21** 278], early harvesting gave more promising results than the daily removal of ripe fruit or the use of poison baits [*cf.* **21** 446]; by gathering the spring crop a few weeks early, the period of maximum activity was avoided and damage to ripe fruits, which suffer most severely, was prevented. During the year, these moths caused the loss of over 90 per cent. of the oranges and grapefruit on agricultural stations. The outbreak of *Ephestia elutella*, Hb., in many cacao stores was the most severe yet experienced and probably arose from prolonged storage of the cacao. As the eggs are laid indiscriminately in stores and the larvae die within 24 hours in the absence of damaged beans or débris [*cf.* **21** 296], control can be best obtained by keeping stores clean and well ventilated. The larvae were parasitised by *Microbracon hebetor*, Say. Rapid and thorough drying of the beans should check infestation by *Araecerus fasciculatus*, DeG. [*cf.* **21** 278]. Little damage was caused to cereal crops by locusts except during December 1932 in the Northern Territories and Northern Ashanti.

Bouffil (F.). **Contribution à l'étude de deux maladies de l'arachide.**—*Bull. Com. Étud. hist. sci. A. O. F.* **16** no 1 pp. 133–144, 3 refs. Paris, January–March, 1933. [Recd. December 1933.]

An account is given of investigations in French West Africa on rosette disease of ground-nuts [*Arachis hypogaea*], some of the information having already been noticed [*R.A.E.*, A **20** 159]. Laboratory experiments proved that *Aphis laburni*, Kalt., is a vector of the disease, though it is not necessarily the only one [*cf.* **19** 505, etc.]. The infection was also transmitted by grafting, but not by inoculation of juice from diseased plants or from crushed adult Aphids. A small number of adults produced the infection much more rapidly than a large number of young individuals. It is not known how the Aphids survive the dry season ; they did not occur on *Acacia*, the only leguminous plant that remains green at this time, but possibly a few infected females shelter in the bark of trees. The Aphids are hard to find on the plants during the heat of the day, when they probably shelter in cracks in the soil. The disease usually appears about the end of August, when the plants sown at the normal time (late June or early July) are already forming numerous pods. At first isolated plants only are attacked, but the infection spreads rapidly, being probably disseminated by winged Aphids. Crops sown after 15th July are more susceptible.

Infested plants were freed from Aphids by spraying twice with 1 gal. kerosene and 4¼ lb. soap in 50 gals. water, and a few days after treatment the plants had more or less recovered. Three varieties of groundnut that in Gambia were believed to show definite resistance to the disease were cultivated, but examination of the crop revealed the presence of the Aphids and infected plants in each variety.

Raucourt (M.) & Trouvelot (B.). **Recherches sur les constituents des feuilles de** *Solanum tuberosum* **déterminant l'alimentation des larves de** *Leptinotarsa decemlineata*.—*C. R. Acad. Sci. Fr.* **197** no. 20 pp. 1153–1154. Paris, 1933.

In a study of the principles in the potato plant that are attractive to *Leptinotarsa decemlineata*, Say [*R.A.E.*, A **22** 7], pieces of elder pith soaked in various extracts of the plant were offered to fourth-instar larvae. The attractive principles, which were found to be present in the green non-filterable part of the juice obtained by pressing the, leaves, were soluble in warm alcohol, but hardly at all in other solvents. They were not volatile, nor were they decomposed by dry heat, but they were destroyed by fermentation, which also produced repellent substances.

Papers noticed by Title only.

Husain (M. A.) & Roonwal (M. L.). **Studies on** *Schistocerca gregaria* **Forsk. The Micropyle in** *Schistocerca gregaria* **Forsk. and some other Acridiidae.**—*Indian J. agric. Sci.* **3** pt. 4 pp. 639–645, 1 pl., 12 refs. Calcutta, August 1933. [Recd. December 1933.]

Shinji (O.). **Three new Species of** *Amphorophora* (**Aphid.**) [from Japan]. [*In Japanese.*]—*Dobuts. Zasshi* **45** no. 538 pp. 347–351, 3 figs. Tokyo, August 1933.

Shinji (O.). **On the Japanese** *Phyllaphis* (**Aphid.**) [no new species]. [*In Japanese.*]—*Kontyû* **7** no. 4 pp. 153–157. Tokyo, October 1933.

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Uchida (T.). **A new parasitic Ichneumonid** [*Hemiteles* (*Rhadiurgus*) *chrysopae*, sp. n.] **in the Egg of** *Chrysopa septempunctata cognata*, **McLach.** [*In Japanese.*]—*Kontyû* **7** no. 4 pp. 167–169, 2 figs. Tokyo, October 1933. (With a description of the new species in German.)

Kamiya (K.). **On a** *Dendrolimus* **attacking** *Lespedeza* [adult and larva described]. [*In Japanese.*]—*Insect World* **37** no. 9 pp. 267–268 Gifu, September 1933.

Veitch (R.). **Cutworm Control** [*Euxoa radians*, Gn., in Queensland].—*Qd agric. J.* **40** pt. 3 pp. 180–182, 1 pl. ; also as *Adv. Leafl. Dep. Agric. Stk Qd* no. 1, 4 pp., 1 pl. Brisbane, 1st September 1933. [*Cf. R.A.E.*, A **16** 450 ; **19** 297.]

Maulik (S.). **A new Hispine Beetle** [*Plesispa cocotis*, sp. n.] **injurious to Coconut** [in New Caledonia].—*Entomologist* **66** no. 847 pp. 280–281, 1 fig. London, December 1933.

Betrem (J. G.). **Die Scoliiden der indoaustralischen und palaearktischen Region aus dem Staatlichen Museum für Tierkunde zu Dresden (Hym.).**—*Stettin. ent. Ztg* **94** pt. 2 pp. 236–263, 8 figs. Stettin, 1933. [Supplements an earlier paper (*R.A.E.*, A **17** 248).]

Frappa (C.). **Un nouveau parasite du cocotier à Madagascar.** *Eugnoristus monachus* **Ol. var.** *alluaudi* **Hust.**—*Agron. colon.* no. 190 pp. 114–116, 2 refs. Paris, October 1933. [*See R.A.E.*, A **21** 494.]

Malenotti (E.). **Ricerche compiute per scoprire i quartieri d'inverno delle cimici del frumento.** [Investigations on the Winter Quarters of the Wheat Bugs, *Aelia rostrata*, Boh., and *Eurygaster* spp., in Venetia and Lombardy.]—*Nuovi Ann. Agric.* **13** pp. 95–104, 1 map. Rome, 1933. [*Cf. R.A.E.*, A **21** 433.]

Beer (S.). **Lo sviluppo delle ghiandole genitali nell'embrione e nella larva del filugello.** [The Development of the Genital Glands in the Embryo and Larva of *Bombyx mori*, L.] **I. L'embrione.**—*Boll. Lab. Zool. Bachic. Milano* **3** (1930–31) no. 1 pp. 79–149, 1 pl. 220 refs. Milan, 1932. **II. La Larva.**—*Op. cit.* **4** (1931–32) no. 1 pp. 27–102, 7 pls. [1933.]

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